ANNUAL REPORT

1987-88

PAKISTAN SCIENCE FOUNDATION

Pakistan Science Foundation

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PAKISTAN SCIENCE FOUNDATION
Almarkaz F 7/2
Islamabad

LETTER OF TRANSMITAL

Islamabad

Dear Mr. Secretary

I have the honour to enclose herewith the Annual Report of the Pakistan Science Foundation for the Fiscal year 1987-88, 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.

With regards.

Yours sincerely,

Sd/-
(Dr. M.D. Shami)
Chairman
PAKISTAN SCIENCE FOUNDATION

Secretary,
Ministry of Science and Technology,
Government of Pakistan,
ISLAMABAD.

30.11.87
2.12.87

PAKISTAN SCIENCE FOUNDATION

CHAIRMAN

Dr. M.D. Shami, M.Sc., (Chemical Technology) Ph.D. (Inorganic-Analytical Chemistry), Washington State University (U.S.A.)_

EXECUTIVE COMMITTEE

Dr. M.D. Shami	Chairman
Dr. Bashir Ahmed Sheikh	Member (Science).
Ch Muhammad Zafar Ellahi	Member/Director Finance, (July, 1987 - February, 1988).
Ch. Zia-ul-Qayyum	Member (Finance) (April-June, 1988).

Board of Trustees

Not Existent.

LIST OF CONTENTS

LIST OF ABBREVIATIONS

Province

B	Baluchistan
C	Centre
F	Frontier
P	Punjab
S	Sind

Sponsoring Institutions

AC	Agricultural College
AU	Agricultural University
EU	Engineering University
QU	Quaid-i-Azam University
KU	Karachi University
HG	Government College, Haripur
PU	Peshawar University/Punjab University
SU	Sind University
KMC	Khyber Medical College
NHL	National Health Laboratories
CSIR	Council of Scientific & Industrial Research
JPMC	Jinnah-Postgraduate Medical Centre
NIAB	Nuclear Institute for Agriculture & Biology

Disciplines

AGR	Agricultural Science
BIO	Biological Sciences

ENG	Engineering Sciences
MED	Medical Sciences
PHY	Physical Sciences
CHEM	Chemical Sciences
MATH	Mathematics & Computer Sciences
EARTH	Earth Sciences
OCEAN	Oceanography
ENVR	Environmental Sciences

INTRODUCTION

The Pakistan Science Foundation was established on June 30th 1973 under the Pakistan Science Foundation Act No.III of 1973 (Annexure-I) as an autonomous body to promote and finance scientific and technological activities having a bearing on the socio-economic needs of the country.Under the Act, the Foundation has been entrusted to carry out the following functions:-

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

ii) promotion of basic and fundamental research in universities and other institutions on scientific problems 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) 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) 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 efforts of the country.

b) 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/engineers and doctors both in and outside Pakistan, and to assist them in collaboration with concerned agencies to seek appropriate employment; and

iii) establish liaison with similar bodies in other countries.

The activities performed under the above mentioned statutory functions are given in the chapters that follow:-

CHAPTER-1

ACTIVITIES & PROGRAMMES

The Activities and Programmes undertaken by the Foundation for the performance of its statutory functions can be broadly divided into four categories:-

i) establish comprehensive scientific & technological information & Dissemination centres

ii) Promote & Finance Scientific Research in the country and the utilization of the research results

iii) Promote and Popularize Science in Society.

iv) International Liaison.

The first activity is carried out through Pakistan Scientific and Technological Information Centre, a subsidiary organization of PSF. The other functions i e. research support, Science Popularization etc.are performed by the Science Section of the Foundation, which is divided into two sub sections as under:-

(A) Research Support Section performing the following activities.

1. Research Support
   a. Grant of Research Projects to individual researchers.
   b. Institutional Support
2. Research Evaluation
3 Scientific Societies/Learned Bodies
4. Exchange of visits
5. Awards and Fellowships.
6. Survey and Statistics
7. Scientists Pool
8. International Liasion.
9. Other Activities.

(B) Science Popularization Section,which carries out the following activities:-

1. Funding for Conferences, Symposia, Seminars, Workshops.
2. Organization of Science exhibitions/fairs.
3. Popular Science lectures.
4. Arranging Film/Planetarium & slide shows.
5. Distribution of Scientific Books & Magazines.
6. Science Promotion through Press & Publications.
7. Science Posters.
8. Promotion of Science in rural areas through Mobile Science exhibition (Science Caravans).
9. Establishment of Science Centres, clubs. etc.

A second subsidiary organization of Pakistan Science Foundation is the Pakistan Museum of Natural History established in 1979 to serve the national needs in the vitally important areas of research, conservation & education involving Pakistan's heritage of natural resources.The Museum is a national repository for permanent storage of plants,animals,rocks, minerals & fossils of the country.

The progress of the work carried out by the Science Sections of the Foundation, PASTIC & PMNH during the year 1987-88 is summarized in the following pages.

PAKISTAN SCIENCE FOUNDATION

RESEARCH SUPPORT SECTION

The progress of the work done by Research Support Section during the year 1987-88 under various statutory functions entrusted to it, is summarised below:-

1. RESEARCH SUPPORT

The 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 carried out its statutory responsibility for the support of scientific research through programmes which include:-

(a) Grant of research projects submitted by individuals or groups of scientists in the universities and research institutions across the nation.

(b) Institutional Support -provision of equipment, literature, staff training facilities, etc. to build institutional capability for conducting research.

A_ GRANTS FOR RESEARCH PROJECTS SUBMITTED BY INDIVIDUAL RESEARCH WORKERS OR GROUPS OF SCIENTIFIC WORKERS:-

Individual Research Project Support is the Foundation's principal programme for the promotion of basic and fundamental research, having a bearing on the socio-economic needs of the country.Progress made under this function is as under:

(a) **New Project:** During the period under report,35 new projects costing Rs.15.224 million were received by the Foundation. Whereas, 54 projects were carried over from the previous year. Thus, in all 89 proposals remained under active consideration of the Foundation during the year 1987- 88. These proposals were examined by experts in the relevant fields, in the light of their scientific merit, relevance to national needs and according to the criteria laid down by the Foundation.

TABLE -1
SUBJECT WISE LIST OF SANCTIONED RESEARCH PROJECTS
(1973-88)

DISCIPLINE	1973-83		1983-84		1984-85		1986-87		1985-86		1987-88	
	No of Schemes	Amount sanctioned	No of Schemes	Amount sanctioned	No of Schemes	Amount sanctioned	No of Schemes	Amount sanctioned	No of Schemes	Amount sanctioned	No.of Schemes	Amount sanctioned
Agricultural Sciences	26	4 741	2	0.645	3	0 655	-	-	2	0.492	4	1.299
Biological Sciences	59	7.951	3	0 560	4	1 254	4	0 869	5	1 457	6	1.338
Chemical Sciences	78	9.591	3	0 618	3	0 314	5	1 363	10	3.341	5	1.444
Earth Sciences	13	1.398	-	-	3	0.670	-	-	4	1 411	-	-
Engineering Sciences	7	1 08	-	-	1	0 167	-	-	1	0 377	2	0.491
Environmental Sciences	14	1.554	2	0.383	-	-	1	0 547	-	-	-	-
Mathematical Sciences	5	0.250	-	-	-	-	-	-	-	-	1	0.043
Medical Sciences	39	4.077	3	0.824	7	1.857	4	1.444	2	0 129	1	0 048
Ocanography	3	0.456	1	0.820	-	-	-	-	-	-	-	-
Physical Sciences	20	3.654	-	-	3	0.970	2	0.986	-	-	4	1.675
Total	264	34.751	14	3.871	24	5.887	16	5.209	24	7.207	23	6.338

The criteria for research are (a) competence of the scientific personnel available to carry out the research (b) Institutional capability i.e., availability of basic equipment,library facilities and support from scientific colleagues (c) scientific merit of the proposed research and (d) likelihood of completion of the project within the stipulated time. Each proposal, after the initial review report,was placed before the Technical and other Committees of the Foundation.

During the report period, the following 23 projects could be sanctioned at an estimated cost of Rs.2.388 million

Title of Scheme	Name of P.I.& Organization supported	Amount sanctioned
Agricultural Sciences:		
Pathogen-free potato plants regenerated from meristom-tip cultures, S-AU/Agr(90)	Mr. Mir Mohammad Rajput, Assistant Professor, Department of Plant Breeding & Genetics, Sind Agricultural University Tandojam	Rs.4,30,867/-
Studies on resistance in egg plant (Solanum melongena) and potato (Solanum tuberosum) and influence of Salinity on infectivity and development of M. javanica. S-KU/Agr (91)	Dr. M A. Maqbool, National Nematological Research Centre, University of Karachi, Karachi.	Rs.1,97,286/-
Determination of contamination of foods by pathogenic microorganisms. P-AG/Agr (92)	Prof. Iqbal Ahsan Baig, Department of Botany, Government College, Lahore	Rs.2,84,300/-
Improvement of Salt tolerance in some important pulse crops P-BZU/Agr (93)	Dr.Mumtaz Hussain Bukhari Director, Institute of Pure & Applied Biology, Bahauddin Zakariya University, Multan	Rs.3,86,700/-
Biological Sciences		
Quantitative survey of population trends of Heliothis armigera and its natural enemies on various plants in Hyderabad District. S-AU/Bio(152)	Dr.Mohammad Khan Lohar, Department of Entomology, Sind Agricultural University. Tandojam.	Rs.1,08,700/-
Ecological guidelines for exploitation of natural resources in Thai and Cholistan Sand Dunes. P-BZU/Bio (154)	Dr. N. H. Bokhari, Institute of Pure & Applied Biology, Bahauddin Zakariya University, Multan	Rs.3,07,200/-

Ecological Studies on some desert plants in district Khairpur, Sind. S-SU/Bio (159)	Prof.Dr.Abdul Rahim Malik, Department of Botany, Sind University, Jamshoro.	Rs.4.,49,400/-
Parasitic survey of wild birds in Baluchistan Province. B-BU/Bio (160)	Mr.Mohammad Nawaz, Department of Zoology, University of Baluchistan, Quetta.	Rs.52,900/-
Screening and isolation of metal resistant bacteria to be used for environmental pollution. S-KU/Bio (166)	Dr.Nuzhat Ahmed, Department of Genetics, University of Karachi, Karachi.	Rs.3,54,800/-
A guide to the Malacostraca of the Northern Arabian sea. S-KU/Bio (167)	Dr. N. M. Tirmizi, Marine Reference Collection Centre, University of Karachi, Karachi.	Rs.65,800/-
Chemical Sciences		
Kinetics and adsorption of catalytic processes. C-QU/Chem (167)	Dr. M. Afzal, Department of Chemistry, Quaid-i-Azam University, Islamabad.	Rs.1,79,700/-
Studies on the metaboism of folats and tetrahydro-biopterin in the mammalian system. B-BU/Chem (179)	Dr. M. A. K. Malghani, Institute of Biochemistry University of Baluchistan, Quetta.	Rs.5,00,900/-
Investigation of pharmacolo- gically active substances from marine flora and fauna S-KU/Chem (182)	Prof.Atta-ur-Rehman, H.E.J.Research Institute of Chemistry, University of Karachi, Karachi.	Rs.2,25,500/-
Synthetic and biological study of Pedrin. S-KU/Chem (185)	Dr M. S. Shakhani, H.E.J. Research Istitute of Chemistry, University of Karachi, Karachi.	Rs.2,16,200/-
Pharmacological studies of the constituents of medi-cinal plants of cardivoas-cular importance. S-KU/Chem (1986)	Dr.Shahid Rashid, Department of Pharmacology, University of Karachi, Karachi.	Rs.3,22,100/-

Engineering Sciences:

Design, development and fabrication of a continuous tray dryer. P-CSIR/Eng (23)	Dr. A. B. Chaudhary, PCSIR Laboratories, Lahore.	Rs.3.43,600/-
Gasification of rice husk for power generation. P-UET/Eng (26)	Mr.Ijaz Ahmed Chaudhary Assistant Professor, Department of Mechanical Engineering, University of Engineering and Technology, Lahore.	Rs.1,47,900/-

Mathematical Sciences:

Study of propoerties of BCK and BCI algebras and their categorical aspects. P-BZU/Math (15)	Dr.M. Anwar Choudhary, Associate Professor, Bahauddin Zakariya University, Multan	Rs.43,900/

Medical Sciences

Association of Compylobactor pyloridis with inflammatory and ulcerative disease of stomach and duodenum. S-JPMC/Med (126)	Prof.Syed Mohammad Alam Jinnah Postgraduate Medical Centre, Karachi.	Rs.48,600/-

Physical Sciences:

Electronic spectra of molecules S-KU/Phys (51)	Prof. Dr. M. Rafi, Department of Physics, University of Karachi, Karachi.	Rs.3,77,100/-
Atomic photo-absorption spectroscopy at high resolution. C-QU/Phys (54)	Dr. M. Aslam Baig, Department of Physics, Quaid-i-Azam University Islamabad.	Rs.6,99,200/-
Characterization of semiconductor lasers. P-BUZ/Phys (55)	Dr. Zakaria Arif, Department of Physics, Bahauddin Zakariya University, Multan.	Rs.3,95,500/-
Quark aspects of nuclear physics. C-QU/Phys (57)	Dr. Pervaz Amir Ali Hoodbhoy, Department of Physics, Quaid-i-Azam University, Islamabad.	Rs.04,100/-

The Ist installments of these projects amounting to Rs.2.195 million were released after signing of their contract agreements with the sponsoring Institutions.Table 1 indicates the Research Grants so far sanctioned by the Foundation.

Brief Summaries of the projects sanctioned in 1987-88 are as under:-

AGRICULTURAL SCIENCES: **S-AU/Agr (90)**

Title: Pathogen-Free Potato Plants Regenerated from Meristem-Tip Culture.

In Pakistan about 80% of the potato yield is affected with viruses and other pathogens. Each year, millions of foreign exchange is spent to import only 5% of the total potato requirements whereas, the remaining requirement is met from the local virus infected yield. There is thus an urgent need for the use of latest technology in this field to obtain the virus free potato

The project aims to grow pathogen free potato plants by applying the tissue culture techniques. The methodology will involve purification of local potato cultivars from common viruses, multiplication of pathogen-free plants and their comparison with infected ones for their yield, quality, and tuber storage ability. Meristemtip cultures will be preferred, as virus growth is minimum in rapidly growing tissues. Virus-free seeds will then be multiplied in open areas

The results of these investigations may help in the production of pathogen-free potato and bringing more cash return to the farmer and saving the valuable foreign exchange.

S-KU/Agr (91)

Title: Studies on Resistance in Egg Plant (Solanum melongena) and Potato (Solanum tuberosum) and Influence of Salinity on Infectivity and Development of M.javanica.

Nematodes are one of the most common parasites that affect the yield & quality of various crops Spray of insecticides and pesticides causes the accumulation of toxic chemicals in the plants.Thus there is a need to use the latest technology for the control of these parasites with minimum adverse effects.

The project is aimed at using the modern cell and tissue culture techniques to produce aseptic nematodes as inoculum so as to breed resistant varieties of potato & egg - plant and to study the growth pattern of nematodes; physiology of parasitism, response of the host plant to infection; multiplication of nematodes in vitro etc Resistant varieties of tomato against M. javanica will be screened out through root explant culture.

Salinity is one of the major problems in some of our agricultural lands. However, no study has been carried out on the effect of soil salinity on plants effected with parasitic nematodes. Accordingly, attempts will also be made to study the effect of high salt concentration on the development and infectivity of M. javanica on common cultivars of tomato.

The results of these studies will help in developing nematode resistant varieties and nematode free healthy crops, which would ultimately benefit the farmers.

P-GC/Agr (92)

Title: Determination of Contamination of Foods by Pathogenic Micro-Organisms.

Contamination of foods by pathogenic micro-organisms causes a great many diseases some of which are fatal. Pakistan, being a developing country, has low standards of cleanliness and hygiene. Road side food vendors have least consideration of sanitary measures. Microbes from soil, air, contaminated water and filth, containing human and animals excreta, get deposited on the uncovered food and cause gastro-intestinal problems

The project envisages investigations on different food samples likely to be easily contaminated with pathogenic microbes, such as water samples, ice, bottled and unbottled soft drinks, sugar and bakery products, milk and milk products, fresh/preserved fruits, vegetables etc. The samples will be tested in lab for their contamination, counting of bacteria and identification by applying standard techniques so as to determine the quality of the foods.

The results obtained will be presented to the Health Departments, concerned agencies to assist them in formulating better public health programmes

P-BU/Agr (93)

Title: Improvement of Salt Tolerance in Some Important Pulse Crops.

Pakistan being an agricultural country is facing the menace of salinity. Every year hundreds of acres of cultivable land is lost due to this problem The preventive measures such as chemical amendments, leaching,drainage and scrapping so far used are quite expensive. The biological approach involving the selection of resistant varieties and development of such varieties by heterosis or induced mutation could be an economical measure for the reclamation of saline soil.

The project envisages the development of salt tolerant genotypes of the four pulse crops, namely Vigna radiata,Cicer arietinum (chana), Cajanus cajan (Arhar) and Lens culinaris (lentil). Lagumes in general, are very salt sensitive. Variations between crop cultivars can be selected or they can be induced by artificial crossing,induced mutations, or through genetic engineering. The crops will thus be screened for their variation & their heritability will be estimated. Salt tolerant genotyps will be selected out of large number of genotypes showing greater degree of variation & efforts will be made to understand the basis of salt tolerance in the selected varieties.In order to assess the success of these lines under natural environmental conditions, selected varieties will be cultivated in Multan and Jhang districts.

The results achieved under this project are likely to benefit the individual farmers in salinity affected areas.

BIOLOGICAL SCIENCES: **S-AU/Bio (152)**

Title: Quantitative Survey of Population Trends of Heliothis Armigera and its Natural Enemies on various Plants in Hyderabad Districts.

The grain legume crops or pulses are important crops of Rabi and Kharif seasons, but due to their susceptibility towards insect pests, their production rate has declined during the last few years.Heliothis armigera the gram pod borer, is one of the most harmful pests of pulses.It causes severe damage to the pulse crops especially the chick peas which is an important pulse crop of Sind province.

The project is aimed at surveying the population fluctuations and the extent of damage caused by the pod borer, in various ecological zones of Sind and studying its natural enemies with a view to develop the methods for biological control of gram pod borer in laboratory as well as field conditions.

The results of these studies may provide basic data for the effective biological control of H. armigera i.e gram pod borer of pulses in Sind.

P-BZU/Bio (154)

Title: Ecological Guidelines for Exploitation of Natural Resources in Thal and Cholistan Sand Dunes.

Sand dunes are the integral part of the arid Thal and semi-arid regions of our country.In Pakistan, four sandy deserts are encountered which include Thal, Cholistan, Thar and Kharan. Among those, Thal & Cholistan deserts have great ecological diversity and are rich in natural resources.These areas have great potentialities for the growth of medicinal plants.However the ecosystem of these deserts have been disturbed greatly due to human activity. Resultantly, suitable habitat for animals and plants is gradually decreasing. The situation demands an urgent implementation of some scientific strategies.

The project envisages:

i) Evaluation of land and agricultural problems of the Thal & Cholistan.

ii) Selection of economically important plants.

iii) Collection of data on the original sand dune communities and their role in that particular ecosystem and

iv) Investigation on the soil texture and morpho-anatomical adaptations of plants in laboratory conditions.

The results of these studies would help in providing guidelines for conservation and exploitations of natural resources in Thal & Cholistan deserts.

S-SU/Bio (159)

Title: Ecological Studies on some Desert Plants in District Khairpur, Sind.

Thar desert is situated lining the eastern border of Pakistan. Vegetation in this area provides fodder, fuel and medicinal herbs for the local population. No thorough study regarding the mechanisms which under lie the establishment and maintenance of eco-systems in this area is carried out so far.

The project is aimed at (a) investigating the structure of plant communities (b) undertaking physio-chemical analyses of soil and (c) assessing the damage caused by grazing animals in Khairpur District. Furthermore,plants of the area will be collected and preserved and detailed information regarding the use of local herbs for various ailments will be obtained.

The results of these studies may help in increasing the vegetation of the area, which in turn would lead to grazing of increased number of animals,availability of fire wood and preventing soil erosion.

B-BU/Bio (160)

Title: Parasitic Survey of Wild Birds in Baluchistan Province.

Baluchistan, the largest province of Pakistan,is famous for its wild life.No authentic record,however, is available about the migratory or the endemic birds. Various studies have shown that the parasitic diseases of domestic animals and poultry are also common in wild-life bird species, which have contributed a lot towards the extinction of some of species.

The project is aimed at surveying the avifauna of Baluchistan for their ecto and endo parasites. For this purpose, common birds will be trapped and checked for parasites These parasites alongwith the host will then be preserved in the Natural History Museum of the Zoology Department in Baluchistan University for future reference and study.

The collected data will provide a sound conservation and management strategy which will save the endangered species from further extinction.

S-KU/Bio (166)

Title: Screening and Isolation of Metal Resistant Bacteria to be used for Environmental Pollution.

An important application of biotechnology in the environment is the extraction and removal of industrial effluent through wide assortment of biochemically varsatile flora, having the power to dissolve any substance and prevent their accumulation on the bottom of sea. Since the ocean is full of different kinds of pollutants, the bacteria present there have been gradually evolved in such a way that

they can digest, attack, and detoxify all different sorts of organic and in-organic pollutants present. The genes for most of these characters are present on extrachromosomal elements known as plasmids.

The project is aimed at exploring these bacteria for the supply of metal resistant plasmids.The studies will include the collection of bacteria from different sea shores around Karachi, analyse them for metal resistant plasmids, characterize them taxanomically, and isolate plasmid DNA molecules by conjugation and restriction analysis Attempts shall be made to check their application for removing metals from industrial effluents and to engineer other bacteria for metal resistance.

The results may provide certain guidelines to keep the sea shore around Karachi free from metal pollution.

S-KU/Bio (167)

Title: A Guide to the Malacostraca of the Northern Arabian Sea.

The most familiar crustaceans occuring along the Pakistan sea coast belong to the group Malacostraca Some of these are abundant and commercially important, whereas several species of prawns, lobsters and crabs contribute significantly to our fisheries resources The prawns, infact, form the backbone of marine fisheries of Pakistan.

However, scientific literature on keys to the identification of these crustacea of north Arabian Sea are scarce as very little scientific work has been done on these animals and publications made, if any, by earlier workers are not available.

The aim of the project is to provide all the references in one place and to prepare a guide with keys and line drawings of commercially important malacostrcan groups (Decapoda and Stomatopoda) for their identification

CHEMICAL SCIENCES: **C-QU/Chem (167)**

Title: Kinetics and Adsorption of Catalytic Processes:

Catalysts play a vital role to increase the rate of reaction by decreasing the amount of starting energy. In order to carry out reactions on industrial scale efficiently and economically, catalysts are very frequently employed Catalytic activity in solids is based on the properties of their surface activity. Thermodynamic and kinetic studies of gases and vapours on solid surfaces help in understanding the solid-gas interactions, which ultimately leads to the better understanding of the catalytic processes.

The project is aimed at studying the adsorption thermodynamics, adsorption kinetics and sorption swelling of polymers with water and water soluble compounds.Thermodynamics and kinetic measurements would lead to the knowledge of various surface parameters such as surface free energy, enthalpy of adsorption, vaporization and condensation coefficients. The data from these measurements would throw some light on the nature of surface interactions and, therefore, help in better understanding of the catalytic activity.

The results of these studies would help in the improvement of some industrial processes that are controlled by catalysts.

B-BU/Chem (179)

Title: Studies on the Metabolism of Folates and Tetrahydrobiopterin in the Mammalian System.

Folates and tetrahydrofolates are biologically vital molecules that are involved in a number of one carbon group transfer reaction These reactions lead to the synthesis of nucleic acids. The axact metabolism (absorption, transportation, distribution and excresion) of these catalytic molecules is still to be discovered.

The present study aims at investigating various aspects of the folate and tetrahydrobioterin metabolism in animal model (Wister Rat) with special reference to metabolism in its brain. Suitable analytical methods including radioactive techniques and chromatography will be employed for the determination and identification of metabolites.

The results of this investigation would enhance the insight of the investigators into the metabolism of folates and tetrahydrobiopterin molecules in Vivo.

S-KU/Chem (182)

Title: Investigation of Pharmacological Active Substances from Marine Flora and Fauna.

Nature has provided a variety of compounds in biotic mass which are available for pharmacological evaluation. Due to the high cost involved in the development of new synthetic drugs, a rapid progress has been made in the field of marine natural product chemistry during the past few decads

The project is aimed at surveying antimicrobial activities of marine organisms, isolating unknown natural products, determining their structures by chemical and spectroscopic means and evaluating the pharmacological activity of the isolated compounds.

The new compounds thus isolated are expected to possess biologically interesting properties, which could be further utilized for the development of new drugs.

S-KU/Chem (185)

Title: Synthetic and Biological Studies on Pedrin.

Pedrin, a highly bioactive compound, was isolated from an African Beetle and is the most complex non-proteinaceous insect-defensive compound. It inhibits mitosis in He La cells, blocks

protein synthesis in eukaryotic cells and causes the cell fusion in human skin fibroblasts at very low concentrations. Because of its unique biological activity and limited availability, efforts are being made all over the world to synthesize the molecules of this compound in laboratory, but so far only one or two groups of researchers have reported total synthesis of this molecule.

The project is aimed at developing total synthesis of Pedrin and synthessing parts of the molecule, its analogs and labelled derivatives for biological studies. The intermediates will be screened for broad base bioactivity and the new synthetic methodology will be utilized in the synthetic problems.

The results of this project are expected to lead to new drug development as well as new tools for biological studies.

S-KU/Chem (186)

Title: Pharmacological Studies of the Constituents of Medicinal Plants of Cardio-Vascular Importance.

Plants have been used for various kinds of diseases since the origin of mankind. Even today, most of the rural population rely for treatment on the indigenous medicinal herbs. However, little is known, scientifically, about the chemical composition of these plants.

The project is aimed at screening and isolating the active compounds from plants that are famous for curing cardio- vascular diseases e.g., Capparis decidua, caralluma edulis, Prosopis juliflora, Nepeta hindostana, Zyzyphus jujuba, Cratagus, sp , Cactus grandiflora, and Allium, sativum. The isolated compounds will be subjected to broad spectrum pharmacological tests for the evaluation of cardiovascular profile. Structures of the active compounds will be elucidated and structure-activity relationship will be established.

The study is likely to provide an in depth knowledge of the beneficial effects of compounds isolated from medicinal plants which could be commercially exploited to provide low cost therapy for cardiovascular diseases.

ENGINEERING SCIENCES: **P-CSIR/Eng (23)**

Title: Design Development & Fabrication of a Continuous Tray Dryer.

Drying of the material is an important unit operation and is carried out prior to packing or despatch of the material. This gives the material such properties which help to resist corrosion and maintain free flowing nature of the material.

The project envisages the designing and fabrication of a compact continuous tray drier which would enable more than one general classes of wet material to be dried.Due to its compact nature and versatility, the unit could be used both for speciality product application and for implant testing. The unit will be operated on various materials and data thus generated will be used for commercial units.The unit would ensure other benefits such as uniform product quality, minimum space

requirement, low power consumption and minimum heat losses.

The successful design development of a continuous tray dryer would prove helpful to the local industries

UET/Eng (26)

Title: Gasification of Rice-Husk for Power Generation:

The declining energy supplies and rapidly increasing consumption focus our attention on the need for searching noval and economical energy resources. In developing countries,13% of the energy demands are met by utilizing the biomass including vast agricultural residue In Pakistan., rice husk is used either in brick furances as fuel or its ash is used in building material components. In China, rice husk is being used in power plants It has been calculated that 60 millions of rice husk equals to 130 million barrels of oil.

The project is aimed at (a) designing a gasifier according to our local environment. The rice husk will be gasified by burning in low oxygen to generate the "Producer Gas." Efforts will then be made to generate electric power from the producer gas (b) Modifying the diesel engine to dual fuel engine. Wherein during continuous operation, rice husk would be used as the supplementary fuel.

The results of this study would help in effective utilization of this vast agriculture residue and providing addition source of energy.

MATHEMATICAL SCIENCES: P-BZU/Math (15)

Title: Study of Properties of BCK and BCI-Algebras, and their Categorical Aspects

New mathematical structures of BCK and BCI-algebras were introduced in 1966, but there is much to be investigated about the self maps, i.e left maps and right maps of these algebras. The category of BCI algebras has not been investigated yet

The project aims at defining and investigating the properties of self maps of BCK and BCI-algebras, existence of limits and co-limits in the category of BCI algebras and making an extensive study of ideal theory of BCK and BCI algebras.

The results would contribute in accelerating the pace of research in the Centre for Advanced Studies and producing trained manpower in the field of mathematics as researchers under this project would be registered for M.Phil/Ph.D.

MEDICAL SCIENCES S-JPMC/Med (126)

Title: Association of Campylobactor pyloridis with Inflammatory and Ulcerative Disease of Stomach and Duodenum.

Camplobactor pyloridis, are micro-aerophilic gram negative, oxidase and catalase positive, spiral shaped bacteria found in human gastric mucosa, particularly in patients suffering from inflammatory ulcerative conditions. One of the remarkable properties of these organisms is their ability to split urea, a feature not seen in other campylobactors, which promoted many workers to search for aetiology of peptic ulcer and inflammatory disease of the stomach and duodenum.

The project envisages to establish an association between campylobactor infection with inflammatory and peptic ulcer disease and its pathogenic effect on gastroduodenal mucosa. The bacteria are sensitive to bismuth compounds and antibiotics, so the treatment of inflammatory and peptic ulceration would become very cheap.

PHYSICAL SCIENCES: **S-KU/Phys (51)**

Title: Electronic Spectra of Molecules:

In recent years molecular spectra have become of increasing importance in the investigation of astrophysical problems. The Cehstial spectra in which bands are observed are those of comets, lower temperature stars, the sun and sun spots. The identification of some of these bands was the direct result of the discovery of new band systems in Laboratory sources The formation of molecules in the lab. and further obtaining the finer details of the spectra is at present, prospective problem for researchers.

The project envisages to record the band systems of diatomics and triatomics - the systems which are expected from the correlation between the molecular states and the atomic states.Prospective molecules for these investigations are hydrides and deutrides of Group I,II,III elements, PH_2, $HOCl_2$, Br_2, HgI_2 and othes interesting molecules will also be searched The studies will be undertaken on a 3 4m Ebert spectrograph having a resolution of 160,000 in second order at 4000A.

The results obtained under this project may help industries like steel, optics, lasers and chemicals in the long run. However, as the project is related to the fundamental research it will provide training to the research personnel for joining the R&D organisations in the country.

C-QU/Phys (54)

Title: Atomic Photoabsorption Spectroscopy of High Resolution:

A detailed knowledge of the energies of the electronically excited and ionised states of atoms and molecules as well as the associated transition probabilities (Cross Section or Oscillatory Strengths) is of fundamental importance to the understanding of the interaction of energetic radiation with matter.Such informations are generally in short supply, yet it is urgently needed not only to extend fundamental knowledge but also to permit an adequate understanding of primary and secondary processes taking place in Radiation Physics, Chemistry and Biology. Spectroscopic investigation of such processes require continuum radiation in the ultraviolet and soft X-ray regions of the electromagnetic spectrum. The only really intense source of continuum radiation beyond 10eV, suitable for quantitative studies of photoabsorption and photoionisation is electron synchrotron

radiation emitted by the 500MeV electron accelerator. This type of electron accelereator is available in advance countries.

The project aims at designing and constructing a high dispersion, high resolution spectrograph for the optical spectroscopy laboratory at Quaid-i-Azam University, Islamabad. The equipment will yield a resolution of the order of million and will be used for the conventional spectrochemical analyses, atomic and molecuar structure studies, hyperfine and band structure, zeeman studies, photoionization and photodissociation investigations.

These studies would find their application in important areas like: decomposition, space chemistry & physics, environmental protection, fusion, plasma, nuclear industry etc.

P-BZU/Phys (55)

Title: Characterization of Semiconductor Lasers:

Semiconductor injection lasers are the potential candidates for laser-fiber broad band optical communication systems Extensive research is being carried out through-out the world to achieve ideal semiconductor lasers having properties, such as (i) low threshold current density (ii) high quantum efficiency (iii) negligible time delays (iv) light emission out-put in a well defined single mode and (v) relatively long operating life time. The research performed uptil now has resulted in a variety of semiconductor lasers but with complicated structures. Efforts are now being made to fabricate lasers having simplified structure for their use in optical communications, range finding and computors.

The project aims at setting up an experimental system in order to study the important properties of different types of commercially available semiconductor lasers. Initially, the studies will be restricted to the measurement of threshold current density, external quantum efficiency and time delay effects. The vacuum deposition of antireflection (AR) coating on the mirror of the laser will be performed to determine the value of the internal losses of the cavity. The properties of various types of semiconductor laser will be compared to understand the internal light guiding mechanism involved in the individual laser and suggest measures to improve the structure and performance of the lasers for their effective use in various fields.

The study would be of great academic and research interest as it would result in training of manpower in this field

C-QU/Phys (57)

Title: Quark Aspects of Nuclear Physics:

Nuclear physics besides its technological applications. is of fundamental interest in the quest for understanding the matter. After 50 years of effort there has been considerable success in understanding nuclear sizes, shapes, binding energies, excitation energies, fission parameters, form factors and so on. The most challenging task for Nuclear Physicsits,at present is to understand nuclei starting from quarks and Quantum Chromodynamics(QCD),as well as to make predictions which

would specifically identify quark degrees of freedom in nuclei.

This project aims at searching the clues to problems of such as: (i) quark exchange effects in electron scattering (ii) Investigation of the role of quarks in stripping and pickup reactions, (iii) Extension of various chiral bag models to incorporate the chiral anomaly, and (iv) and to get an insight of QCD (Quark Chromodynamics) and two dimensional nuclei by applying the Bethe-Salpeter equation for simple case of two dimensions.

The results of these investigation may answer to a number of questions on quark aspect of nuclear physics. Moreover, the project personnel will receive research training in this important field of science.

B) INSTITUTIONAL SUPPORT:

The Pakistan Science Foundation assists the Universities in the provision of equipment, literature etc., to research workers who for one reason or another, are unable to obtain these from their own institution and it is established that such support would lead to quick progress of research.

During the current financial year institutional support requests were received by the Foundation from various Universities and research organisations. However, due to paucity of funds grants totalling to Rs 0.190 million were given to following two institutions for the purchase of equipment/literature:

Sr.No.	Name of Institution	Grant Released
1.	University of Peshawar, Peshawar	Rs.1,00,000/-
2.	Pakistan Scientific & Technological Information Centre (PASTIC), Islamabad.	Rs.90,670/-

2. RESEARCH EVALUATION:

The Foundation has laid down the procedure for monitoring the progress of PSF supported research projects and evaluating the research of such research. The technical and fiscal reports of the on-going & completed projects received by the Foundation for the purpose, during the report period, are as under:-

i) Semi-Annual Reports:

Twenty nine (29) semi-annual reports, received after the initiation of each project and/or after the submission of the annual reports, were scrutinised by the Research Support Section to assess the interim progress of these projects prior to release of their next due instalments. The particulars of these reports are as under:-

Project No:	Title of the Project	Reports
S-PCCC/Agr (77/1)	Development of commercial cotton hybrid.	2nd Semi-Annual
S-PCCC/Agr(77/1)	Development of commercial cotton hybrid.	3rd Semi-Annual
P-PU/Agr (81)	Effects of Aflatoxins in Poultry.	2nd Semi-Annual
P-PU/Agr (81)	Effects of Aflatoxins in Poultry	3rd Semi-Annual
P-VC/Agr (85)	Study of epidemiology of human and animal origin, in Punjab	2nd Semi-Annual
P-PU/Agr (86)	Studies on phenology, germination ecology and control of some important weeds of wheat	3rd Semi-Annual
P-UEI/Agr (89)	Evaluation of adopted reclamation practices in Pindi Bhattian project.	1st Semi-Annual
S-KU/Bio (116)	Chemotaxonomic studies in angiosperms (from Pakistan) with reference to phenolics.	Ist Semi-Annual
P-PU/Bio (141)	Studies on the Siwalik Artiodectyla (Suoidea, Anthracotherroidea and Cervoidea).	2nd Semi-Annual
P-PU/Bio (149)	Hormonal influences on skeletal muscle grafts.	2nd Semi-Annual
P-PU/Bio (153)	Study on the stability of hybrid plasmids carrying segments of Bacillus subtilis in B.coli.	Ist Semi-Annual
F-PU/chem (153)	A Thermodynamic study of the supermolecular order in aqueous solutions of polyvinyl alcohol.	2nd Semi-Annual
C-QU/Chem (159)	Synthesis and development of hydrogels for sustained release of drugs.	Ist Semi-Annual
B-BU/Chem (162)	Chemistry and biochemistry of glycoprotein sulfotransferases and suslfate acceptors.	Ist Semi-Annual
S-KU/Chem (163)	Amino acid sequence study on hemoglobin and venoms from snakes found in Pakistan	Ist Semi-Annual

S-KU/Chem (165)	Isolation and structural studies on the chemical constituents of Ervatamia coronaria.	3rd Semi-Annual
S-KU/Chem (170)	Studies on the chemical constituents of capparidaceous plants of Pakistan.	Ist Semi-Annual
P-CSIR/Chem (171)	Biosynthesis of Antibiotic Bacitracin in Bacillus licheniformis as supplement in poultry feed.	Ist Semi-Annual
S-SU/Chem (172)	Application of high performance element analysis at trace levels using ketoamine schiff bases.	Ist Semi-Annual
C-QU/chem (175)	Estimation of heavy trace metals in various local fish species and relevant marine/fresh water	Ist Semi-Annual
C-QU/Chem (177)	Studies on the chemical constituents of some Labiateae plants of Pakistan.	Ist Semi-Annual
B-BU/Chem (178)	Immobilization of enzymes and their application in "Flow Injection Analysis" for the determination of substrates of diagnostic importance.	Ist Semi-Annual
C-PMNH/Earth (30)	Mineralogy & geochemistry of cambrian formation in Salt Range.	Ist Semi-Annual
AJK/Earth (32)	Stratigraphic analysis of mesozoic and paleogene rocks of Hazara, Azad Kashmir and adjacent areas of Rawalpindi district and variations in Kohat Potwar Province of Indus Basin.	Ist Semi-Annual
S-AKNC/Med (105)	General Anesthetic Respiratory Function and Gama Amino Butyric Acid (GABA) levels in Rat Brain.	2nd Semi-Annual
S-KU/Med (108)	Studies on protein changes	Ist Semi-Annual
C-QU/Phys (44)	Deep levels transient spectroscopy on semi conductor materials.	3rd Semi-Annual
C-QU/Phys (49)	Coherence properties of radiation in non-linear optics and lasers.	2nd Semi-Annual

C-QU/Phys (50)	Computer simulation of Laser Fusion: some aspects of Plasma Physics.	2nd Semi-Annual

ii) **Annual Reports:**

As many as eleven (11) First Annual and eleven (11) Second Annual Reports in respect of PSF ongoing projects received by the Foundation, during report period.

FIRST ANNUAL REPORTS:

Project No.	**Title of the Project:**
S-PCCC/Agr (77/1)	Development of Commercial Cotton Hybrid.
P-PU/Bio (136)	Pest Status, Food Preference and control of Termites of Pakistan.
P-PU/Bio (149)	Hormonal Influences on Skeletal Muscles Grafts.
C-QU/Chem (159)	Synthesis and Development of Hydro-gels for Sustained Release of Drugs.
S-KU/Chem (164)	Iron Release Mechanism from Biological Iron Transport Compounds.
P-CSIR/Chem (171)	Biosynthesis of Antibiotic Bacitracin in Bacillus licheniformis as supplement in poultry feed.
C-QU/Chem (177)	Studies on the Chemical Constituents of Some Labiatae Plants of Pakistan.
S-JPMC/Med (85)	Biochemical Studies on Trauma.
P-PMI/Med (91)	An Etiological Study of Urolithiasis in D.G. Khan, Muzaffargarh and Bahawalpur.
S-KU/Med (108)	Studies on Protein Change in Senile Cataract.
C-QU/Phys (50)	Computer Simulation of Laser Fusion: Some Aspects of Plasma Physics

SECOND ANNUAL REPORTS:

Project No.	Title of the Project:
S-PCCC/Agr (71/1)	Development of Commercial Cotton Hybrid.
P-PU/Agr (81)	Effects of Aflatoxins in Poultry.
P-VC/Agr (85)	Study of Epidemiology of Human land Animal Origin in Punjab.
P-PU/Bio (121)	Effects of Heavy Metals, with Special Reference to Cadmium and Lead, on Common Edible Fish of Pakistan.
P-PU/Bio (141)	Studies on the Siwalik Artiodactyla (Suoidea, Anthracotherioidea and Cervoidea)
P-CSIR/Bio (145)	Collection of Record of Reptilian Fauna of Table Land Potwar, Punjab.
F-PU/Chem (153)	A Thermodynamic Study of the Super-molecular Order in Acqeueous Solution of Polyvinyl Alcohol
S-KU/Chem (170)	Studies on the Chemical Constituents of Capparidaceous Plants of Pakistan.
F-PCSIR/Envr (28)	Track Filter Systems Development and their Applications in Biological and Environmental Sciences.
S-JPMC/Med (98)	Byssinosis in Cotton Industries of Sind.
C-NIH/Med (110)	Mother Infant Transmission of Hepatitis B-Virus in Pakistan.

After initial scrutiny by the Research Support Section Staff the Technical Reports were sent for detailed evaluation to the subject experts in the relevant fields of specialization. On receipt of satisfactory evaluation reports, fiscal scrutinies of the expenditure incurred out of the PSF project grants were prepared in respect of each project for verification and audit prior to the sanction & release of next due instalments The technical reports alongwith the evaluation reports of the experts, were then submitted to the respective Technical Committees for consideration. The remarks of the Technical Committee, if any were conveyed to the Principal Investigators of the concerned projects for information and compliance.

iii) **Grants Released for On going Research Projects**:

Research grants totalling to Rs.2.479 million were released on account of various instalments in respect of the ongoing projects mentioned in subpara (i) & (ii) above.

iv) **Final Reports:**

Ten (10) Final Reports in respect of the completed projects (listed below) were received during the year under report These were also sent to the subject experts for evaluation and on receipt back from the experts, were submitted to the relevant Technical Committee for adoption. The final audited account statements of these projects were scrutinized for adjustment of funds and closing of the project accounts. The copies of final report were deposited in PSF and PASTIC Libraries for reference and record.

Project No:	**Title of the Project**
S-KU/Agr (88)	Studies on Culturing of Meloidogyne incognita and Heterodera zeae on Excised Roots of Tomato and Corn.
S-KU/Bio (132)	Extra Chromosomal Elements for In vivo Genetic Engineering.
C-QU/Chem (94)	Isolation, identification and strutural Modification of some Bisbenzyl Isoquinoline Akaloids from Plants.
P-PU/Chem (106)	Synthetic and Catalyatic Aspects of New transition Metal Alkyls and Aryles.
P-PU/Chem (169)	Development of Procedure for the Extraction and refining of Beryllium from Beryl Ores of Pakistan
S-KU/Envr (24)	Hazardous Effects of Industrial Pollution and Environment due to Refineries and Oil Spills.
S-KU/Med (45)	Hemoglobin Structure Changes and their Impact on Function.
C-QU/Med (88)	Use of Carcino Embryonic Antigen for Cancer Diagnosis
P-PMI/Med (91)	An Etiological Study of Urolithiasis in D.G. Khan, Muzaffargarh and Bahawalpur.
S-KU/Ocean (4)	Shore Erosion Studies of Pakistan Coast in the Viccinity of Karachi.

v) **Compilation of Project Data:**

The data about research support programme has been updated and compiled in respect of on-going as well as completed projects.

vi) **Summaries of Final Research Reports:**

Brief summaries of the final research reports received during the report period, as mentioned in subpara IV above, are as under:

Project No.	S-KU/Agr (88)
Project Title:	Studies on Culturing of Meloidogyne incognita and Heterodeara zeae, on excised roots of Tomato and Corn.
Name of Investigator	Dr. M A Maqbool
Project Particulars:	
_ Duration	Two years
_ Date of commencement	1.7.1985
_ Date of Completion	30.6.1987
_ Implementing Agency	National Nematological Research Centre, University of Karachi, Karachi.
_ Total Expenditure	Rs.1,64,987/-
Main Objectives.	Screening and development of local nematode resistant varieties of tomato and corn plants through root explant culture.

Summary of the Work Done:

Root-knot nematodes Meloidogyne spp. and cyst nematodes Heterodera spp. are major nematode problems in crop production, particularly under tropical weather conditions. Because of their economic importance in the country, studies were carried out on the culturing of Meloidogyne incognita and Heterodera zeae to screen out resistance in different varieties of tomato (Lycopersicum esculentum) and of corn (Zea mays)

A number of media were tested for the development of pure cultures of M. incognita on tomato and H. zeae on corn plants out of which Linsmaier & Skoog medium was found best for shoot development and Gamborg's B-5 medium proved best for root culture. These two media were therefore used for further studies.

Eleven cultivars of tomato viz. Rutgers, Sanmarzano, Large round red,Marmande, Waltergaint, Roma VF, Marglobe, Roforto, Lyallpur Selection, PARC I, PARC II and five cultivars of corn viz. Azam, Dehgan, Ehsan, HRC and Shaheen were evaluated for resistance and life cycle studies of M. incognita and M. javanica on tomato and Heterodera zeae on corn in vitro.

Almost all the tomato cultivars tested were found susceptible to M. incognita and M. javanica infection with varying degrees of infection except PARC I, which was found to be partially resistant.

Tomato seeds were surface sterilized with 2-5% and of corn with 5-20% NaOCl. Sterilized seeds were placed for germination on 1.8% water agar and incubated at 25-30C. Egg masses of M. incognita, M. javanica and cysts of H. zeae were surface sterilized with 0.1% mercuric chloride. Temperature ranging 25-30C was found suitable for the growth of tomato roots and development of M. incognita and M. javanica, while a temperature range of 30-35C was found best for the development of H.zeae on corn roots

Life cycle studies indicated that both the root-knot nematode, M. incognita and M. javanica complete their life cycles within 20-25, 25-35 and 35-45 days on susceptible, moderately susceptible and partially resistant cultivars respectively at 25-28C in vitro.

All the corn cultivars used to screen resistance against corn cyst nematode Heterodera zeae in vitro were found susceptible at varying degrees to H. zeae No cultivars were found resistant to this nematode. Studies showed that Heterodera zeae requires 18-20 days to complete its life cycle on susceptible corn cultivars at 30C in vitro.

These studies have provided basic information on the infectivity of these pathogenic nematodes on their respective host cultivars which would help investigating the development of effective control measures.

Publications:

As a result of the research carried out under this project, one research paper entitled: "A preliminary note on Sterilization of Meloidogyne eggs with various concentrations of NaOCl and HgCl was published in the International Nematological News letter 3(4), 1986:34-37.

Postgraduate Degrees:

Under this project, one student was enrolled for Ph.D. degree The title of the thesis was "Culture Studies on M javanica with reference to Plant Resistance "

Project No.	S-KU/Bio (132)
Project Title.	Extra chromosomal elements for In Vivo genetic engineering.
Name of Investigator:	Dr. Miss Hajra Khatoon
Project Particulars:	
_ Duration	Two years

_ Date of Commencement	1.9.1985
_ Date of Completion	31.8.1987
_ Implementing Agency	Department of Microbiology, University of Karachi, Karachi.
_ Total Expenditure	Rs.3,28,497/-
Main Objectives:	To study large variety of bacteria for the presence of various types of Plasmids and transponsons for in vivo genetic engineering of important bacteria.

Summary of the Work Done:

This research was undertaken to isolate the extra chromosomal elements (plasmids and transposons) from bacteria associated with plants as these elements can be used for in vivo genetic engineering of gram negative bacteria of plant origin. As many as194 bacteria were screened for their resistance to a variety of broad spectrum antibiotics namely Ampicillin, Agrimycin, Chloramphenicol. Gentamycin, Kanamycin, Streptomycin and Tetracycline The screened bacteria, which included species of plant pathogenic bacteria (e.g Xanthomonas, Erwinia, Pseudomonas etc.) as well as plant symbiotic bacteria (e g. Rhyzobium) exhibited antibiotic resistance in different patterns and combinations These bacteria were tested for the presence of plasmids (R plasmids) by conjugating them with standard Escherichia coli recipients and observing whether the resistances born by them were transferable or not. From the experiments conducted, it appears that the tested bacteria either lack plasmids or contain plasmids that are conjugally non-transferable At times, an abortive transfer of resistance was observed indicating that the plasmid was although transmitted but could not be stably maintained in Escherichia coli. A great difficulty in detecting the conjugal transmission was infective donor elimination in most cases.

Some of the plant pathogenic/associated bacteria exhibited the production of bacteriocins (known to be usually associated with the presence of bacteriocinogenic plasmids). However, none of these bacteria transferred its bacteriocinogenic plasmids by conjugation. The difficulty was again ineffective donor elimination.

As parallel attempt, plasmids of other gram negative bacteria were studied to determine as to whether they could be used for in vivo genetic engineering of plant pathogenic/associated bacteria. In this regard, twelve R plasmids were isolated from gram negative enteric bacteria and screened for resistance to seven different antibiotics. The R plasmids, that carried different patterns of antibiotic resistance, were then studied for their conjugal transmission to plant pathogenic/associated bacteria including: Xanthomonas, Erwinia, Citrobacter, Rhyzobium, Agarobacterium and Pseudomonas. Some of these R plasmids could be conjugally transmitted to as many as four different bacteria of plant origin. However, some could be transmitted to three, two or one plant pathogenic/associated bacteria The R plasmids were not only transmitted to plant pathogenic/associated bacteria but also expressed all their resistance in these bacteria. Studies were also made to see whether these R plasmids are stably maintained in their new hosts. Most of them (R plasmids)were found to be neither completely or partly stable indicating that they could be used for in vivo genetic engineering of plant pathogenic/associated bacteria. Retransfer of the R plasmids from plant pathogenic/associated

bacteria to enteric bacteria could not be detected due to some technical difficulties. Similarly, the R plasmids were not found to carry any transposons during studies conducted so far.

It has been concluded that the broad-host range R plasmids isolated from bacteria could be used as vehicles for in vivo genetic engineering (by using the available transposons, such as bacteriophage Mu) of plants pathogenic/associated bacteria.

Project No.	C-QU/Chem (94)
Project Title:	Isolation, Identification and Structural Modification of some Bisbenzyl Isoquinoline Alkaloids from Plants
Name of Investigator:	Dr. Mrs. Roshan Ahmed
Project Particulars.	
_ Duration	One Year
_ Date of Commencement	16.8.1980
_ Date of Completion	15.8.1981
_ Implementary Agency	Department of Chemical Sciences, Quaid-i-Azam University, Islamabad.
_ Total Expenditure	Rs.99,850/-
Main Objectives:	To isolate a number of known and some new compounds from medicinal plants known to contain anticancer alkaloids.

Summary of the Work Done:

Use of plant material for the cure of diseases has been known for many centuries. Even today plant preparation are employed for the treatment of certain diseases including different types of tumours.

The project was undertaken to screen a number of plants in and around Islamabad, belonging to the family Ranunculerceae, for the isolation and identification of anticancer alkaloids. The results of these investigations are summarised below:

A_ ISOLATION AND IDENTIFICATION OF ALKALOIDS:

i) Alkaloids from Cissampelos pareira.

C. pareira is a creeper growing on slopes of hilly areas of Indo-Pak region. A number of alkaloids have been isolated and reported from its roots previously. During the present study, five new alkaloids namely Laudanosine, Nuciferine, Bulbocarpine, Corytuberine and Magnoflorine were isolated, which have not been reported previously from this plant.

These isolated alkaloids were compared with known samples and their structures were elucidated by spectroscopy.

ii) Alkaloids from Machilus odoratissima:

M. odoratissima is a tall tree found in Muree and A.J. Kashmir forest. Present work was attempted to isolate chemical constituents of leaves and bark of this plant. Compounds isolated included Ocopodine, Chondrocurine, Apomorphine-dimethyl ether and two unidentified alkaloids Techniques applied for the identification of these compounds included m.p., specific rotation i.r., n.m.r and mass spectrum.

iii) Alkaloids from Thalictrum rochebrunianum:

The genus Thalictrum is known to be a rich source of benzylisoquinoline derived alkaloids In continuation of the Photo-chemical investigation of the above mentioned species, efforts were made to investigate new alkaloids. Three alkaloids namely thaliglucin-one, 2-nor thali brunine and o- methyl thalibrunine were isolated which were not previously reported from this plant.2-Nor thalibrunine was N methylated with formaline/Na-NH_4, which yeiled thalibrunine. Attempts were made to O-methylate thalibrunamine with diazomethane which remained unsuccessful. Structure of O- methyl thalibrunamine was determined spectroscopically.

B_ STRUCTURAL MODIFICATION OF SOME KNOWN ALKALOIDS:

i) Attempts to Introduce Methyl group in the 6a angular position of aporphines.

Aporphines having methyl group on 6a position have neither been isolated from natural sources nor synthesized. Nuciferine was selected as a model

compound and different bases including (CH_3) Cd, CH_3 MGI, CH_3 Li & $(CH_3)_2$ CuLi were tried to introduce a methyl group at 6a position but the end product was always dehydronuciferine. Perhaps bases used were too basic to act as nucleophile. They resulted in deprotonation giving back the starting material.

ii) **Attempts to prepare 7-dimethyl Nuciferine.**

Not many compounds having two methyl groups at 7-position are known to be isolated from natural sources. Different phase transfer catalysts tried include cetyl trimethyl ammonium bromide, benzyl trimethyl ammoniumn hydroxide (Triton B)and tetrabutyl ammoniumn hydroxide. The reduction of aldehyde group of Nuciferine to methyl group yielding methyl dehydronuciferine, was easily done but its further reaction with CH_3 to yield 7-dimethyl Nuciferine remained unsuccessful. Instead, the end product was a brown oil, of which only 50% of the starting material could be recovered by column chromatography.

Project No.	P-PU/Chem (106)
Project Title:	Synthetic and Catalytic Aspects of New Transition Metal Alkyls and Aryls.
Name of Investigator:	Dr. Mohammad Zafar Iqbal
Project Particulars:	
_ Duration	3 Years & 1 Year Extension
_ Date of Commencement	1.1.1981
_ Date of Completion	31.12.1984
_ Implementing Agency:	Institute of Chemistry, University of the Punjab, Lahore.
_ Total Expenditure:	Rs.1,42,752/-
Main Objectives:	To investigate the chemistry of transition metal alkyls and aryls which exhibit unusual structures and chemical reactivities.

Summary of the Work Done:

One of the major world problems is the exploitation of new & renewable energy resources. Transition metal complexes play an important role in those molecular catalyst systems which control specific chemical transformations. These chemical transformations can help effectively, to solve the energy problem.

The project was undertaken to study the chemistry (i.e. synthesis, reactivity and structures) of diverse transition metal alkyls and aryls which exhibit unusual structures and chemical reactivities. Detailed analysis was made of catalytic and kinetic aspects of these compounds and the new ones. Empirical formulae, molecular weight and structures of new compounds were established by employing spectroscopy, chemical microanalysis and other physical measurements. On the basis of the properties of these compound, polynuclear structures of these compounds were proposed.

Different types of reactions including that of transition metals with N.N.Dimethyl benzylamine and benzylideneanaline were carried out to provide basic knowledge for the ultimate development of new molecular catalysts.

Project No.	P-PU/Chem (169)
Project Title:	Development of Procedure for the Extraction and Refining of Beryllium from Beryl Ores of Pakistan
Name of Investigator:	Dr. Mohammad Ali Khan
Project Particulars:	
_ Duration	One Year & 4 Months
_ Date of Commencement:	1.2.1986
_ Date of Completion	30.4.1987
_ Implementing Agency:	Institute of Chemistry, University of the Punjab, Lahore.
- Total Expenditure:	Rs.1,14,249/-
Main Objectives:	To design new procedures for effective extraction and refining of Beryllium Metal.

Summary of the Work Done:

Beryllium metal has become one of the most important metals, as it possesses some specific properties regarding its density, strength, high M.P., and lowest absorption cross- section for thermal neutrons. It is being used extensively in the formation of X-ray window, missiles, aircrafts, and as a moderator in nuclear technology. In Pakistan, heavy deposits of Beryl ore are present but no serious attempt has ever been made to exploit the metal on commercial scale.

Under this project, investigations were carried out to design a new procedure for the extraction and refining of Beryllium metal. Instead of conventional metallurgical procedures, extraction was done by employing the solvent extraction procedures. The metal, being highly poisonous, required special care in its handling and processing at every step. Therefore, the operational unit was especially designed for the purpose.

Complete chemical analysis of the Beryl ores was carried out using various analytical techniques. Leaching of the ore was done to get total metal which was then extracted in different solvents to study the distribution ratios of pure Beryllium alongwith other metals. Radio active nucleoids were used for the determination of recovery percentage and to trace impurities in the final products. The end product was found to be 94.5% pure showing a good recovery. The results have led to the conclusion that the new procedure designed for recovery of Beryllium metal is feasible for exploitation of Beryl ores on industrial scale.

Postgraduate Degrees:

One student was registered for Ph.D.degree in chemistry under this project.

Project No.	S-KU/Envr (24)
Project Title:	Hazardous effects of industrial pollution to environment due to refineries and oil-spills.
Name of Investigator:	Prof. Dr Akhlaq Ahmed.
Project Particulars:	
_ Duration	Three Years & 3 Months.
_ Date of Commencement	1.11.1981
_ Date of Completion	31.1.1987
_ Implementing Agency:	Department of Applied Chemistry, University of Karachi, Karachi.
_ Total Expenditure:	Rs.2,89,160/-
Main Objectives.	To assess the hazardous effect of pollution due to wastes from refineries and oil spills near Keamari, Karachi.

Summary of the Work Done:

The phenomenal increase in population as well as industrialization is causing pollution in major cities of Pakistan. Among these, Karachi being the most heavily populated, and the biggest industrial city, is situated on Karachi sea coast. Its industrial effluents are causing marine pollution and damage to the marine life.

The project was undertaken to assess the nature, sources and hazardous effects of large volumes of wastes from oil refineries and oil spills The wastes contain oil, metals, suspended and dissolved solids, sulphides, phenolic compounds and many other exotic compounds. The source of hydrocarbon wastes is usually from leaks and spills, leakage from heat exchangers and pumps in cooling water.

Pollution due to oil from the two refineries namely National Refinery Ltd. and Pakistan Refinery Ltd, four boat basins, and spills near Keamari was studied in terms of various pollution parameters. The survey and the experimental data collected revealed that both refineries (NRL and PRL) and the oil spills cause hazardous effects and damage to the environment, particularly to marine environment and coastal waters. The pollution parameters,DOD_5, T.D.S., pH and conductivity show marked increase. The concentrations of sodium, potassium, sulphur, C.O D. chloride and copper also show upward trend. Oil from refineries, river and terrestrial run-off reaches the coast in dilute form, adsorbed on suspended materials. Oil entering the beach directly from spills is subjected to a variety of physico-chemical and biological changes. Later on these are decomposed by micro-organisms.

In case of solid wastes, studies were carried out with regard to source,segregation,quantities and characteristics of solid wastes, source reduction, resource recovery and treatment before ultimate disposal. Some preliminary studies were made on gaseous effluents also. Air pollutants from the refineries consist of H_2S, NH_3, SO_2, NO_x HCl, aldehydes, mercaptans and particulate matters such as smoke, fumes, mists and dusts. Air pollution control for SO_2, H_2S, NH_3, NO_x and hydrocarbons have been suggested.

Critical analaysis of the effluents treatment plant at N.R.L. with the existing effluent treatment equipment was done & standards of treated effluent were suggested.

Heavy metals including Cx, Co, Fe, Zr & Ni in two refineries were analysed before and after treatment. The Minimum National Standards (MINAS) for the oil refineries in terms of pollution parameters have been suggested after comparing the results with other developed countries.

Project No:	S-KU/Med (45)
Project Title:	Hemoglobin structure changes and their impact on function.
Name of Investigator:	Prof Zafar H Zaidi
Project Particulars:	
_ Duration	One Year & 3 months
_ Date of Commencement	6.6.1981
_ Date of Completion	22.9 1982
_ Implementing Agency:	H.E.J. Research Institute of Chemistry, University of Karachi, Karachi.
_ Total Expenditure:	Rs.54,109/-
Main Objectives:	_ Systematic study of abnormal hemoglobin in anaemic pregnant patients.

_ To determine the Amino Acid sequence of isolated abnormal peptides, establish the mutational site and co-relate the effect of structural changes with the function of the molecule.

Summary of the Work Done:

Anaemia is an important health problem in developing countries. Though it is presumed that most of the cases are due to nutritional deficiencies,it has, however, been shown that sickle cell anaemia is a genetic disease, resulting from a single residue mutation of glutamine for valine in ß-Chain at 6th position of the hemoglobin molecule.

During the present project detailed studies on abnormal hemoglobin from antenatal pregnant women were undertaken to determine the distribution of abnormal hemoglobin and their relation to anemic condition during pregancy. For this purpose 1050 antenatal, 300 umbilical cord and 100 normal venous blood samples were collected in FDTA, from antenatal clinic, Department of Obstetrics and Gyanecology, J.P.M C, Karachi and analysed. Whole blood hemoglobin concentration was determined according to Drabkins which showed that 70% women were anemic out of which 3.61% were severely anemic. The screening of abnormal hemoglobin was carried out electrophoretically on cellulose acetate membrane in Tris FDıA. Borate butter (TEB) which showed that 20 samples were abnormal of which 7 seemed to be new variants of hemoglobin. The abnormalities were identified and partially characterized.

The study has revealed that anemic conditions in Pakistani pregnant women are higher as compared to other developing countries.

Project No.·	C-QU/Med (88)
Project Title:	Use of Carcino Embryonic Antigen for Cancer Diagnosis
Name of Investigator:	Prof. Dr. M.H Qazi
Project Particulars:	
_ Duration	Two years
_ Date of Commencement	1.1.1984
_ Date of Completion	31.12.1985
_ Implementing Agency:	Department of Biological Sciences, Quaid-i-Azam University, Islamabad.
_ Total Expenditure:	Rs.1.51.071/-

Main Objectives:	To isolate and purify cancer embryonic antigen (CEA) from tumor cells (breast, lung and stomach) and determine the presence of CEA in these tissues.

Summary of the Work Done:

The synthesis and secretion of Carcino-embryonic proteins by malignant cells has proven useful to the clinicians both in diagonsing cancer and also in understanding the development of this disease. Carcino Embryonic Antigen (CEA) which is secreted by cancer cells can be used as a marker for cancer.

The studies were carried out to isolate CEA, in a relatively pure form, from a number of malignant tissues. Serum samples from 88 cancer patients and 23 normal subjects were analysed for CEA activity. Highest level of CEA was obtained in the sera of patients with colorectal cancer (44.65± 21.13 ng/ml Vs 3.8 ± 2 34). The analysis of serum samples of patients suffering from 13 different types of cancers provided the information that the colorectal cancer, the lung cancer and oesophageal cancer all of which have endothelial origin, do secrete large quantities of CEA Furthermore, the data clearly shows that measurement of serum levels of CEA can be used as an effective index for the diagnosis of these types of cancer.

Analysis of CEA content of malignant tissues indicated that CEA is synthesized in substantial quantities by the colo- rectal tissues (upto 21mg/g tissue), followed by tongue, mandible, hip and chest sarcomas. No comparison of these data could be made with those of the corresponding normal tissues.

Project No	P-PMI/Med (91)
Project Title:	An Etiological Study of Urolithiasis in D.G. Khan, Muzaffargarh and Bahawalpur
Name of Investigator:	Dr Farakh A Khan
Project Particulars.	
_ Duration	Two years.
_ Date of Commencement	1.1.1986
_ Date of Completion:	31 12 1987
_ Implementing Agency:	Department of Urology, Postgraduate Medical Institute, Lahore.
_ Total Expenditure:	Rs.1,60,340/-
Main Objectives:	_ To study high incidence of stone disease in D.G. Khan, Muzaffargarh and Bahawalpur.

_ To investigate the etiological factors in these areas and compare the results with patients in Lahore.

Summary of the Work Done:

Urolithiasis is very common in D.G. Khan, Muzaffargarh and Bahawalpur district. Recurrence of the disease is more than likely and it is well known to doctors practicing in these areas.

During the present study, 14 hospitals were visited and data regarding urinary stone disease was collected from their operation registers. 24 hours urine and blood samples were collected from patients at four hospitals i e., D.G. Khan, Muzaffgrah , Bahawalpur and Rahim Yar Khan and analysed at K.E.M.C. Lahore.

These investigations have revealed the following two important aspects of stone disease in comparison with previous studies conducted in Lahore:

i) The incidence and prevalence of bladder stone disease in children has fallen in the Northern Punjab, although it is still common in Southern Punjab.

ii) The serum and urinary variables show that calcium is not a risk factor in Northern or Southern Punjab, Serum and urinary uric acid is perhaps important in stone formation. The other variables (24 hours urinary volume, urinary PH, serum and urinary phosphate, urinary oxalate, serum and urinary creatinine, serum and urinary proteins and serum and urinary electrolytes) show a difference between Northern and Southern Punjab.

The significance of these findings need further verification as the dietary, environmental and other factors may be involved in these difference.

Project No.	S-KU/Ocean (4/1)
Project Title·	Shore erosion studies of Pakistan coast in the vicinity of Karachi.
Name of Investigator:	Dr. S.M.A. Tirmizi
Project Particulars:	
_ Duration	Three Years & 3 Months
_ Date of Commencement	1.8.1980
_ Date of Completion	15.12.1983

_ Implementing Agency	Department of Physics, University of Karachi, Karachi.
_ Total Expenditure	Rs.1,57,490/-
Main Objectives:	To study the physical oceanographic parameters and collect data on wave energy for quantitive evaluation of coastal erosion.

Summary of the Work Done:

The research work was undertaken to study the process of shore erosion along the coast of Karachi. The area under investigation included the coastline from Manora Island to Cape Monze. Six different locations in this area were selected for taking observations and collection of samples. Due to the limitations regarding instruments and sea-going facilities, the study was carried out near the shore only. The observations from the six fixed reference points along the coast were taken after every fortnight, including the recording of visual wave data, wind data and samples of sediments and sea water. In order to track the offshore movement of suspented load, satellite imageries were visually interpreted.

In the laboratory the sediment samples were dried and sieved for the determination of variations in grain size in surf zone at each station for different seasons. From the visual wave data, an attempt was made to workout the long shore energy flux in surf zone due to breaking waves.

It was observed that during SW-monsoon the dissipation of wave energy caused considerable changes on the beaches and surf zone, thus large amounts of sediment were brought into suspension by the collapsing waves During the session of high wave energy, the waves predominatly approach the coast line obliquely resulting in the transport of sediment along the coast and "On and Off" shore. During the post-monsoon and pre-monsoon period the beaches and near-shore zone are subjected to only moderate to low wave energy conditions and rebuilding of beaches takes place in these periods

It was found that the beach material removed due to erosion is greater than the beach material deposited back and thus there is a net loss of beach material in the area. Near Paradise point, erosion is quite severe as the wave's attack causes landslides. The most crucial area is near Sandspit station No.6 where sea water was found to cross the Sandspit on several occasions. Thus, immediate measures are required to protect the Sandspit and Paradise Point, both being favoured excursion spots.

Publications:

As a result of the research carried out under this project, one research paper entitle: "Distribution of Seabed Material along the coastal area of Karachi during the Southwest Monsoon" was published in the Pakistan Journal of Scientific and Industrial Research Vol.26 No.2: April, 1983.

3. 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.0.455 million were released during the year under report to the following Non-Government Organisations/ Scientific Societies for the achievement of their approved objectives including publication of their journals.

Name of Society	**Grants in Rupees**
Pakistan Academy of Sciences	Rs. 80,000/-
Pakistan Association of Scientists and Scientific Professions.	Rs.30,000/-
Scientific Society of Pakistan	Rs.60,000/-
Pakistan Association for the Advancement of Sciences	Rs/60,000/-
Pakistan Medical Association	Rs.15,000/-
Zoological Society of Pakistan	Rs.30,000/-
Botanical Society of Pakistan	Rs.30,000/-
Biological Society of Pakistan	Rs.30,000/-
Pakistan Society of Biochemists	Rs.15,000/-
Chemical Society of Pakistan	Rs.30,000/-
Institution of Electrical Engineers	Rs.30.000/-
Institute of Engineers, Pakistan.	Rs.30,000/-
Pakistan Society of Nematologists.	Rs.15,000/-
Total:	Rs.4,55,000/-

Funds totalling Rs.0.090 million were sanctioned to the following institutions as annual grant-in-aid for the publication of journals indicated against each:

Institutions	**Name of Journal**	**Amount of Grant**
University of Karachi, Karachi.	Journal of Pharmacy	Rs.10,000/-

Pakistan Council for Science and Technology Islamabad.	Journal of Science, Technology & Development.	Rs.25,000/-
Mehran University of Engineering & Technology Jamshoro.	Mehran University Research Journal	Rs.10,000/-
Pakistan Forest Institute, Peshawar	Pakistan Journal of Forestry.	Rs.10,000/-
Khyber Medical College, Peshawar	Pakistan Oral & Dental Journal	Rs.10,000/-
Government College, Lahore	Journal of Natural Sciences and Mathematics	Rs.5,000/-
Federal Urdu Science College, Karachi.	Urdu Journal 'Tahqeeq"	Rs.10,000/-
University of Karachi, Karachi.	Journal of Pharmacology	Rs.10,000/-
	Total:	Rs.90,000/-

4. EXCHANGE OF VISITS:

Exchange of visit of Scientists and Technologists with other countries.

Scientists, today, cannot work in isolation. They not only require latest literature in their relevant fields of research but also need interaction with scientists in advance centres of learning. Due to lack of such facilities many of our scientific workers become obsolescent and lose enthusiasm, freshness and spontaneity. Thus, our scientific workers must be able to meet their counterparts in the advanced societies and visit international and regional research centres and universities of repute. The Foundation provides travel grants to scientists for presenting their research papers in International Conferences Symposia and to meet their counterparts in institutions of higher learning in advance countries.

During the report period, 11 travel grant requests were approved by the Foundation. However, only the following five scientists could avail these grants amounting to Rs.72,671/- after completion of requisite formalities for N.O.C. ect.

Name and Address of Scientist	**Conference/Seminar Attended**	**Amount Sanctioned**
Dr. Sakhawat Shah, Department of Chemistry, Quaid-i-Azam University, Islamabad.	6th International Conference on surface and colloid science, Hokone Japan.	Rs.19,331/-

Prof. Shaukat Raza Khan, King Edward Medical College, Lahore.	6th Asian Congress of Paediatrics, Tokyo, Japan.	Rs.15,210/-
Miss Rashida Shaheen, PMNH, Islamabad.	Course on Museum and Education, York-Shire, U.K.	Rs.14,110/-
Dr Mohiuddin Ali Khan, N.E.D. University of Engg. and Technology, Karachi.	International Conference on Urban Shelter in Developing Countries London, U.K.	Rs.12,580/-
Dr. K.M. Khan, University of Sind, Jamshoro.	XIV International Botanical Conference, Berlin, W. Germany.	Rs.11,440/-
	Total:	Rs.72,671/-

5. AWARDS AND FELLOWSHIPS:

The Foundation, as a partial effort towards the training of high level man-power within the country, provided Rs.27,000/- on account of post graduate fellowships @ Rs.1500/- p.m. to two students for completion of their Ph.D. Degrees at the following institutions·

Fellow	Institution	Period	Fellowship
Mr G. Q. Khaskheli	Institute of Chemistry, University of Sind.	6 Months	Rs.9,000/-
Mr. Ihsanul Haq	Department of Physics, University of Punjab	1Year	Rs.18,000/-

6. SPECIAL SCIENTIFIC SURVEYS AND STATISTICS:

The Foundation supports special surveys in various fields related to scientific subjects which are not undertaken by any other organization Such projects are occasionaly received by Foundation for financial support. Details of studies financed are as under:

a) During the report period Foundation released funds amounting to Rs.0.130 million to the Pakistan Academy of Sciences for an ongoing survey project S&T in the Muslim Ummah and its Methodical Development. The survey project would yield a number of monogrpahs on S&T man power and other resources in the Muslim World.

b) The Foundation supported a feasibility study on the "Utilization of rice husk for activated carbon" in order to explore as to how the local resources could be utilized for production of value added products. The study was completed in 4

months and expenditure of Rs.50,000/- was incurred on the preparation of this feasibility report. The report is being sent to concerned organisations for comments.

7. SCIENTISTS'S POOL:

The Foundation assists the Scientists who return to Pakistan after completion of higher studies, through appointment on the Scientist Pool provided they obtain Research/Teaching assignments in the local universities or research organizations. If appointed on the Pool,they are given a subsistance allowance of Rs.2,500/-per month. This facility enables them in establishing contacts with agencies relevent to their fields of research and finding jobs suited to their qualifications.

Requests from two scientists for placement on PSF Scientists'sPool, were received by the Foundation during the report period. These Scientists however, did not fulfil the requisite formalities hence their requests were not acceded to by the Foundation.

8. INTERNATIONAL LIAISON:

The Foundation during the report period,remained in contact with international, regional and national agencies,like US- National Science Foundation (NSF), Islamic Foundation for Science, Technology and Development (IFSTAD), Islamic Educational,Scientific and Cultural Organization (ISESCO), Royal Society London, UNESCO, ESCAP, etc. Association of Pakistan Scientists and Engineers of North America (APSFNA). Their representatives visited Pakistan Science Foundation to discuss matters of mutual interest including Collaborative Research Projects, Conference. Advisery Services, Institutional Support etc.

Some of the activities performed by the Foundation in collaboration with foreign Scientific Organisations are as under:-

a) MEMORANDUM OF UNDERSTANDING BETWEEN THE ROYAL SOCIETY OF LONDON U.K. AND THE PAKISTAN SCIENCE FOUNDATION.

The Foundation continued the implementation of memorandum of understanding between the Royal Society of London, and the Pakistan Science Foundation. During the report period one Pakistani namely Dr.N.M. Butt, Head, Nuclear Physics Division, Pakistan Institute of Nuclear Science and Technology, Islamabad visited Chemical Crystallography Laboratory of the Oxford University,U.K. for two weeks in October, 198. The Foundation provided a grant of Rs.14,110/- on account of his return air-fare from Pakistan to U.K. whereas, his expenses in U.K. were borne by the Royal Society.

b) SAARC WORKSHOP:

In the 4th Meeting of the SAARC Technical Committee on Scientific and Technical Cooperation held at Colombo, Sri Lanka in October1986, it was decided that Pakistan would host a SAARC Workshop on Women in Science and Technology in 1987. The Ministry of Science and Technology of

the Government of Pakistan assigned the responsibility of organizing the Workshop to Pakistan Science Foundation.

The Workshop was held from 17th to 19th November, 1987, at Islamabad Hotel, Islamabad. In addition to 42 delegates from Pakistan, 6 foreign delegates i.e., Women Scientists from Bangladesh, India, Nepal and Sri-Lanka, participated in the Workshop The country paper of Pakistan was prepared by the Foundation for this Workshop.

The funds amounting to Rs.1,03,420/- for the Workshop were provided by the Ministry of Foreign Affairs of the Government of Pakistan.

c) MEMORANDUM OF UNDERSTANDING BETWEEN US-NATIONAL SCIENCE FOUNDATION AND MINISTRY OF SCIENCE AND TECHNOLOGY.

The Foundation is acting as a focal point for the Universities in respect of their collaborative research projects, conferences/seminars etc. for funding under the US-NSF special foreign currency programme. During the report period, funds for the following on-going project were released by the Foundation:

Chromosome Number of Vascular Plants of Pakistan (PSF/C-Res/NSF (3) Rs. 78,250/-

As regards the under process/ new projects received from the universities for financing under the US-NSF special programme, the same were returned to the sponsoring institutions as per instructions received vide Ministry of Science and Technology letter No.6(9)/87-ASA(IL) dated 22.5 1988 stating that US-NSF foreign currency funds had since been exhausted and were not available for new projects. Accordingly the projects pending with the Foundation have been returned to the Sponsoring Institutions.

d) APSENA MEETING:

Six Members of Expatriate Pakistani Scientists and Engineers of North America (APSENA) visited Pakistan in Dec. 1987. A meeting of these scientists was arranged by the Foundation on 27 & 28 Dec., 1987 wherein subject experts from the local S&T organisations/Universities were invited to discuss ways and means for an active collaboration in the areas of high priority research, transfer of knowledge and assistance in training of manpower in S&T fields.

A copy of the report prepared by National Talent Pool regarding manpower requirements for projects/programmes pertaining to various organisations in the country was presented to the expartiate scientists who promised to look into these requirements and dissemination information among those Pakistani scientists/doctors and engineers who were intending to return to Pakistan.

As regards collaboration in S&T projects the following priorities were initially selected:

1. Biotechnology

2. Metallergy

3. Electronics

It was also decided that in order to expedite action, APSENA members would deal directly with the concerned local institutions to develop collaborative programme under intimation to the Foundation.

9. OTHER ACTIVITIES:

a) Construction of Pakistan Science Foundation Building:

The PC-I for the construction of Pakistan Science Foundation Headquarter Building at Science Complex site on the Constitution Avenue, Islamabad costing Rs.9.767 million for a period of two years was prepared and submitted to the Ministry of Science & Technology. The PC-I was approved by the D.D.W.P:. in its meeting held on 17th April, 1988 and an allocation of Rs.0.5 million has been made in the ADP, 1988- 89 for preliminary drawing, designing, soil survey etc.

b) Reports Submitted to the Ministry of Science and Technology/Other Agencies.

i) A report for the budget speech of the Ministry of Finance, Planning and Coordination for the year, 1988-89 was prepared and provided to PSF Finance Wing in March, 1988 for forwarding the same to the Ministry of Science & Technology.

ii) As report on Foundation's activities was prepared and sent to he Ministry of Science and Technology in July, 1987 for the publication of the year book under Rule 25 of the Rules of Business, 1973.

iii) Brief annual reports of the Foundation for the year, 1985-86 and 1986-87 were prepared and sent to the Ministry of Science and Technology in reply to a Starred Senate Question.

iv) A report on Targets and Achievements of the grants of the Ministries/Divisions during 1986-87 was prepared in respect of the Foundation and its affiliated offices i.e. PASTIC AND PMNH for forwarding to the Auditor General of Pakistan through the Ministry of Science and Technology.

SCIENCE POPULARIZATION SECTION

Pakistan Science Foundation pays special attention towards the promotion and popularization of science in the country. Providing financial assistance for National/International Science Conferences/Symposia/Workshops, collaboration with Board of Intermediate and Secondary Education in the organisation of Science exhibition, Popular Science Lectures, Planaterium, Science Film Shows and Summer/winter schools for talented students are some of the activities which have been maintained consistently. The major events supported by the Foundation during 1987-88 are:-

(1) FUNDING FOR CONFERENCES, SYMPOSIA, SEMINARS, WORKSHOPS.

The Foundation provides financial assistance for National and International Science Conferences, Seminars, Symposia and Workshops held in Pakistan During the period under report grants totalling Rs.410,000/- were given to various scientific organizations and institutions for the organization of such events:

Name of the Event	Organizing Agency	Amount Granted
Autumn College on Techniques in many Body problems.	Department of Physics, University of the Punjab, Lahore.	Rs.30,000/-
Third All Pakistan Conference of Plant Scientists	Department of Botany University of Peshawar, Peshawar	Rs.25,000/-
Seminar on Physical and Mathematical Modelling of Hydraulic Structures.	University of Engineering and Technology, Lahore.	Rs.20,000/-
24th Pakistan Science Conference	University of Karachi, Karachi.	Rs.40,000/-
First Regular Meeting of Inter-Governmental Oceanographic Commission Regional Body for Indian Ocean in Pakistan.	National Institute of Oceanography, Karachi.	Rs.50,000/-
Additional Funding for Publication of Proceedings of Symposium on Biologically Active Macromolecules.	University of Baluchistan, Quetta	Rs.20,000/-
Symposium on Mineral Resources and Geology of Pakistan	Centre of Excellence in Mineralogy, University of Baluchistan, Quetta.	Rs.20,000/-

International Seminar on Tectonic Evolution of Collision Zones Between Gondwanic and Eurasian Blocks.	National Centre of Excellence in Geology, University of Peshawar, Peshawar.	Rs.20,000/-
Third International Symposium in Natural Products Chemistry	H.E.J. Research Institute of Chemistry, University of Karachi, Karachi.	Rs.25,000/-
International Symposium on Protein Structure Foundation Relationship	H.E.J. Research Institute of Chemistry, University of Karachi, Karachi.	Rs.17,000/-
International Workshop on Protein Sequencing	H.E.J. Research Institute of Chemistry, University of Karachi, Karachi.	Rs. 8,000/-
Pakistan Electronics and Engineering Exhibition 1988.	University of Engineering and Technology, Lahore.	Rs.10,000/-
6th FAOB Symposium in Biochemistry for Development.	Pakistan Society of Biochemists, Lahore.	Rs.10,000/-
International Seminar on Hydrological Aspects of Drainage in Irgated Areas.	Pakistan Council of Research in Water Resources, Islamabad.	Rs.10,000/-
Seminar on Forty Years of Science & Technology in Pakistan.	Pakistan Association of Scientists and Scientific Professions (PASSP), Karachi.	Rs.20,000/-
National Workshop on Teaching of Physics-1987	APWA Govt. College for Women, Karachi.	Rs. 5,000/-
8th All Pakistan Zoological Congress.	University of Baluchistan, Quetta	Rs.30,000/-
Second International Symposium on Biologically Active Macromolecules.	University of Baluchistan, Quetta.	Rs.50,000/-

2) SCIENCE EXHIBITION/FAIRS

The Foundation provided assistance in organizing Four Science exhibitions/Fairs for students. During the period under report, grants totalling Rs.118,200/- were sanctioned/released to the organizations listed below for holding these events:-

Organizing Agency	Event	Grant Released
Federal Directorate of Education, Islamabad.	Science Exhibition at Pakistan Academy of Sciences, Islamabad.	Rs.18,200/-
Buren of Curriculum and Extension Centre, Department of Education, Quetta Baluchistan	6th Science Exhibition	Rs.30,000/-
Board of Intermediate and Secondary Education, Sargodha.	Science Fair 1987	Rs.35,000/-
Board of Intermediate and Secondary Education Hyderabad.	Science Fair 1987	Rs.35,000/-

(3) Popular Science Lectures:

A total number of 9 lecturers were arranged in which eminent Scientists/Scholars addressed themselves to the audiance in non-technical language. The names of the speakers and the topics are as under:-

Month	Name of Speaker	Topic of Lecture
July, 1987	Maj. (Retd) Aftab Hassan, Secretary-General, Scientific Society of Pakistan.	Urdu as medium of Instruction and Science.
August	Mr. Salim Mehmud, Chairman, SUPARCO	Space Technology in Pakistan.
September	Dr. M M. Qureshi, Fellow and Editor, Pakistan Academy of Sciences.	Science and Seven Skies
November	Lt.Gen.(Rtd.)Mujib-ur-Rehman Khan, Chairman, Literacy and Mass Education Commission (LAMEC)	LAMEC and its Literacy Programmes.
January, 1988	Dr Shaukat H. Baloch, Director-General, National Centre of Technology Transfer.	Technology Transfer in Pakistan.
February	Dr. Saleem Ahmad, Research Associate, East West Centre, Hawaii, USA	Potentials of Neem for Pest Control and Rural Development.

March	Mr. Abdul Qayyum Qazi, Joint Scientific Adviser, Ministry of Science & Technology, Islamabad.	Development of Science and Technology.
April	Dr. M. A. Hussain Mullick, Professor, Department of Economics,Quaid-i-Azam University.	Science and Technology: The Principal emerging Agents of Change.
April	Prof. Dr. S.A. Durrani Department of Physics, University of Birmingham, U K.	Nuclear Tracks and their Applications on Earth and in Space.

(4) Film/Planetarium and Slide Shows:

(A) **Science Film Shows:**

The Foundation continued showing Science films in schools in Islamabad/Rawalpindi area. A total number of 18 schools were covered during the period under report. Film shows were also arranged at the Science Fairs organized by Board of Intermediate and Secondary Education, Hyderabad in January, 1988 and the Peshawar University Science Club, Peshawar in May, 1988.

(B) **Planaterium Shows:**

The Planaterium shows arranged during the report period are as follows:-

Shows arranged at Schools in Islamabad/ Rawalpindi.	32
Shows arranged at Science Fair, Hyderabad	50
Shows arranged at Science Fair Peshawar University Science Club Peshawar.	20

(C) **Preparation of Urdu Commentry:**

A running commentry in Urdu on planaterium shows was written and recorded on tapes in the Foundation. The commentry is played during the screening of the shows.

(D) **Science Slid Shows:**

A programme of Science Slide Shows has been initiated and is shown to students and the general public. Slides have been prepared on the following themes:-

- Scientific & Technological Progress in Pakistan.
- Extinct Animals.

- Heavenly Bodies.

Urdu commentry has been recorded for a large number of slides.

(5) Distribution of Science Books and Magazines:

The Foundation this year also distributed Science Books/Magazines to educational institutions free of cost. The details of the distribution are as under:-

Institutions	Books/Magazine
Special Education School for Deaf Children, Islamabad.	A set of 35 Science Books (Published by Feroze Sons/National Book Foundation).
Government Hashmat Ali Islamia College, Rawalpindi.	Encyclopedia - Science and Technology Illustrated (28 Volume Set).
Government Gordon College, Rawalpindi.	-do-
Public School and College for Boys Jatial. Gilgit.	-do-

The Foundation also subscribed for the popular Science, Magazines in Urdu, 'Jadid Science' and 'Science Bachoon Key lye' for 460 schools in the country including those of the Northern Areas of FATA, FANA and Azad Kashmir. The subscription was for the period - July, 1987 - June 1988.

(6) Science Promotion through Press:

Regular features entitled 'Science Diary' highlighting Science related events in the country are regularly published in the national dailies These articles are contributed by the Science Promotion Officer, PSF. A total number of 30 articles were published in 1987-88.

Publications:

- The book entitled 'The History and Natural History of Ephedra AS SOMA' by Dr. S. Madhi Hassan was published and distributed free of cost to R&D organizations and University Libraries, totalling 145 in number.

- A 24-page book-let was published for distribution with the planaterium shows.

(7) Science Poster Project:

Six thousand copies of the second set of ten Science Posters were printed and mailed to Higher Secondary Schools in the country. The posters depicted attractive colour pictures on Scientific

themes like - Baluchitherium, Braunto-Saurs, SUPARCO Rockets and portraits of eminent Muslim Scientists, Alberuni and Al-Tabari.

Science Poster Contest:

Science Poster Contests were held at the Boards of Intermediate and Secondary Education as well as at National Level. The topics for the two compitions were:-

"Science in the 21st Century"	At Board's Level.
"Science in the Service of Huminity"	At National Level.

Students from the Karachi, Hyderabad, Sukkur, Lahore, Sargodha, Peshawar and Federal Board of Intermediate & Secondary Education, Islamabad, participated. Cash prizes amounting to Rs.19000/- and Certificates were awarded to the winners of the compitions.

(8) Promotion of Science in Rural Areas:

Science Caravans:

The first unit of the Science Caravan was completed during the period under report. It consists of paintings, models, illustrated panels and write ups on a variety of scientific and technological topics. Working models of a number of scientific equipments have been procured from different organizations like, PCAT, SUPARCO and TIP. Audio-visual equipment (colour TV/VCP). Computers, planaterium etc. were purchased and included in the Caravan

Some of the themes displayed are:-

1. **Space Research.**

The moon landing and shuttle programme have been presented through models and photographs. A set of 40 slides alongwith taped commentry and a video film on space research is also included.

2. **Computers**

The working of the computers is explained by means of charts, display of components and booklets. The computers are provided for handling by the participants.

3. **Solar Energy**

The caravan carries models of solar powered devices like Solar Cooker, Water heater etc. alongwith solar cell panels to demonstrate the usefulness of solar energy.

4. **Bio Gas Plants.**

Photographs and models of the biogas plants and its working are depicted.

5. **Nuclear Energy**

The tremendous potential of nuclear energy is explained alongwith its peaceful applications in power generation, medicinal issues, food preservation etc. Working of Atomic reactors is also explained through colourful photographs.

6. **Coal Mining**

The panel portrays the geological formation of Coal and its mining through charts, photographs and a 16 mm Colour film. Model of a Coal mine is also displayed.

7. **Exhibits on Oil and Gas Expoloration.**

This include models and charts illustrating the process of drilling for oil and gas, refining of Crude oil, use of lubricants etc.

8. **Communications.**

The working of telephone, Mosse key, and telex system are illustrated through working models. Mechanism of radio, television and communication satellites are also displayed.

9. **Health - Related Exhibits.**

Some important landmarks of medical Science are potrayed. Video films on anti-rabies and anti snake venom vaccine are included.

Models of dish Antenna, Sounding Rocket, three stage rocket, solar cooker are included for the interest of school students and the general public. The mineral resources and sea wealth of the country are also displayed. The first unit of the Science Caravan was inaugurated on 15th November, 1987, at an impressive ceremony arranged at the Pakistan Academy of Sciences Building. An elaborate programme for the Science Caravan's visit to schools in Islamabad/Rawalpindi districts was chalked out in collaboration with Federal Directorate of Education, Islamabad. The Caravan visited 19 schools in Bharakau and 12 in Nilore during the year 1987-88.

8.(a) Construction of Additional Units of Science Caravan.

Tenders were invited in connection with Construction and Equipment of Additional Units of Caravan. The contract for designing, engineering, fabrication and completion of two Science Caravans was given to TECHMA (PVt.) Ltd., Lahore, for a total cost of Rs.2,470,000/-

8.(B) Exhibition Arranged by PSF.

On the occasion of Science Caravan inauguration a Science Exhibition was organized for High Schools of Islamabad, in collaboration with the Federal Directorate of Education, Islamabad. Twenty-two schools participated and a large number of visitors from Educational Institutions of Rawalpindi and Islamabad attended the Exhibition.

Category	**Prizes**
_ Grils Students	Rs.2,000/-(3) prizes)
_ Boy Students	Rs.2,000/-(3 prizes)
_ Teachers	Rs.3,000/- (3 prizes)
_ Overall best Exhibit	Rs.5,000/-
_ Best decorated stall	Rs.3,000/-

Certificates were awarded to all participating students.

(9) Science Clubs Project.

- Pakistan Science Foundation has initiated a Science Clubs programme for High Schools in the country. Under this programme, detailed instructions will be provided to High School Students for carrying out interesting Science Projects and Experiments under the guidance of the School Science Teacher. It is hoped that this will greatly encourage students involvement in scientific activities, besides enhancing their technical skills.

- Science-related literature will also be provided to the Science Clubs.

- Letters were sent to all 5000 High Schools in the country alongwith proforma for obtaining necessary information for establishment of Science Clubs. Replies were received from about 800 schools.

- Letters were sent to Heads of R&D Organisations requesting them to identify projects for the Foundation which may be handled by the students, particularly in rural areas, without any costly equipment. Projects were received from the following organizations:

i) National Institute of Oceanography, Karachi.

ii) Centre of Excellence in Mineralogy, University of Baluchistan, Quetta.

iii) The Centre for Solid State Physics, University of the Punjab, Lahore.

iv) Shaikh Zayed Postgraduate Medical Institute, Lahore.

v) National Institute of Silicon Technology, Islamabad.

vi) Sind Agricultural University, Tandojam.

vii) Department of Chemistry, Quaid-i-Azam University, Islamabad.

viii) SUPARCO, Karachi.

ix) Centre for Advance Molecular Biology, University of the Punjab, Lahore.

x) National Nematological Research Centre, University of Karachi, Karachi.

- The Foundation invited Science Projects/Experiments through press from Science Teachers, Engineers etc. Awards of Rs.2,000/- were announced for selected projects.

Thirty projects were received in response.

10. Collaboration with Adventure Foundation and AGHA Khan Foundation:

During 1987-88 Pakistan Science Foundation collaborated with Adventure Foundation, Pakistan, and Agha Khan Foundation, Pakistan, to conduct programmes involving Pakistani and foreign youth in National Science Projects under the expert guidance of Scientists from the Pakistan Museum of Natural History (PMNH).

Approximate Cost involved Rs.150,000/-

PAKISTAN SCIENTIFIC & TECHNOLOGICAL INFORMATION CENTRE (PASTIC)

The progress with regard to the activities carried out by the Pakistan Scientific and Technological Information Centre, Islamabad, and its four Sub-centres at Karachi, Lahore, Quetta and Peshawar, during the period under report is delineated under:-

(1) DOCUMENT PROCUREMENT AND SUPPLY SERVICE.

Against seven thousand nine hundred thirty nine (7939) requests received from the clients during 1987-88, six thousand six hundred and eighteen (6618) documents were procured and supplied. The documents provided were hard copies/microforms and consisted of articles form Science and Technology Journals, patents and reports

Translation of one research paper from spanish to English was also provided to a client.

(2) PUBLICATIONS

(A) A monthly publication titled 'Technology Information' consisting of reports on the indegenous technologies developed by ten developing countries Pakistan, India, Phillippines, China, Egypt, Kenya, Zimbabwe, Brazil, Maxico and Peru has been started in July, 1987. The information is received through the Technological Information Pilot System (TIPS), a UNDP sponsored project, for which PASTIC is coordinating agency. Volumes 1 -11 were published during the period under report and mailed to more than 2000 clients (industries/organization) in the country.

(b) **Other Publications.**

1. Pakistan Science Abstracts
   1987 Vol.27 No: 3,4

2. List of Scientific Serial holdings of the following organization's Libraries were printed.

ISLAMABAD

I) Pakistan Academy of Sciences

ii) Pakistan Science Foundation

iii) Pakistan Museum of Natural History

iv) Pakistan Council of Appropriate Technology

v) A.Q. Khan Laboratories

vi) National Agricultural Research Centre

vii) National Fertilizer Development Corporation

viii) National Institute of Health

ix Oil & Gas Development Corporation

LAHORE

i) University of Engineering & Technology

ii) Centre of Excellence in Water Resources, University of Engineering & Technology.

iii) Centre of Excellence in Solid State Physics, University of the Punjab.

iv) Department of Zoology, University of the Punjab.

v) Veterinary Research Institute.

PESHAWAR

i) Centre of Excellence in Physical Chemistry, University of Peshawar.

ii) Directorate of Animal Husbandry.

TAXILA

i) University College of Engineering & Technology

(3) National Science Reference Library:

Thirteen Hundred and eighty eight (1388) issues of periodicals, Two hundred seventy six (276) documents and three hundred six (306) books were received, catalogued and classified in the National Centre. The Karachi Sub-Centre received 145 periodicals and documents.

(4) Programming & Data Processing

PASTIC has seven micro-computers, donated by UNESCO. It maintains three data bases as follows:-

a) Research published in Pakistan This currently has 8,100 records.

b) Serial Holdings of Libraries, Records of 80 Libraries of S&T institutions in the country available in machinery double form.

c) Patent Information, 60 000 records available.

(i) **Data Entry**

a) Patent Information - Bibliographic data of 22691 patent records was entered bringing the total number of records to 52680.

b) Scientific Research Literature Published in Pakistan = A total of 1536 new records of Pakistan Science Abstracts were entered

c) Lists of Scientific Serial Holdings = 18575 records of Science and Technology Journals of 23 Libraries were entered,

d) Technology Information = 5722 records of technology offers & requests reported by TIPS were entered

e) NTIS Reports = I1570 reports were entered.

f) Bibliographies = 1608 records of 35 bibliographies were entered.

g) TIPS - 8193 records of Technologies developed were entered.

ii) **Data Out Put**

Camera ready copies for printing of the following documents were prepared:-

a) Pakistan Science Abstracts - 305 records.

b) List of Scientific Serial Holdings of 23 Libraries = 18575 records.

c) Union Catalogue of Scientific Serial Holdings of Libraries of Rawalpindi - Islamabad. 27749 records on 3705 titles of 19 Libraries.

(5) Bibliographies.

Thirty five (35) subject bibliographies containing 1524 references were prepared.

(6) Union Catalogue

Lists of Scientific Serial Holdings of seventeen Libraries containing 16570 records of 3168 journals were prepared and published.

Also, a Union Catalogue of Scientific periodicals of Libraries of Rawalpindi-Islamabad containing 27749 records of 3705 titles was published

(7) Current Content Service.

Photocopies of content pages of 12 Science and Technology Journals received through IDRC were prepared and provided to 219 researchers on monthly basis by the National Science Reference Library.

The Karachi Sub-Centre distributed contents of 11 periodicals to 28 organizations on monthly basis

(8) Reprography

The reprography unit completed 130 printing jobs of 9 organizations. For these 103282 pages of photocopy, 7692 cyclostyles and 2315495 printing impressions were produced.

(9) Infoterra Referral Service.

The following information was supplied to:-

1.	Pakistan Council for Appropriate Technology	i) List of data base on energy.	13 data base.
		ii) Use of Agriculture waste in low cost house construction material.	3 ref.
		iii) Data bases on Agriculture.	20 data base.
2.	University of Engineering and Technology, Lahore.	iv) Renewable energy	
		v) Biogas development.	31 ref.

(10) Important Technical Meetings/Visits etc.

a) Following meetings were attended by PASTIC delegates:-

i) PNCU - UNISIST

II) First SAARC Documentation Expert Committee meeting (March 9-11, 1988) New Delhi.

b) The Director ICIMOD from Khatmando (Nepal) visited PASTIC for establishment of a data - base.

PAKISTAN MUSEUM OF NATURAL HISTORY (PMNH)

The Pakistan Museum of Natural History is presently functioning in a rented building in Sector F-7 of Islamabad Besides a Display Corner has also been established at Marghzar to display larger exhibits. The tenders have been invited for the construction of permanent Museum Building approved by ECNEC, which will be opened soon.

The Museum is serving national needs in three vitally important but neglected areas: Research, Conservation and Education, involving Pakistan's heritage of natural resources. It will ultimately also serve as national repository for permanent storage of reference material of plants, animals, rocks, minerals and fossils, deposited in other organisations/institutions of the country.

At present consisting of three Research Division, i.e. Botanical Sciences, Earth Sciences, Zoological Sciences and a Public Service Division (including Design Section) the Museum contains a large amount of reference material pertaining to fauna, flora, rocks, minerals and fossils of Pakistan as well as goal oriented educational exhibits/displays for public awareness about the country's rich Natural Heritage

Summary of the progress made by Pakistan Museum of Natural History during the year 1987-88 is given below.

1. BOTANICAL SCIENCES DIVISION.

Reference Collection

Collection of Flora Field works were carried out in Lehtrar, Chairt, Pathrate, Talhar, Pir Sohawa, Ghalib Gul Baba, Mankhial, Wah Cantt, Islamabad, Kaghan, Bunir, Hunza, Gojal, Nagar, Gilgit, Passu, Hyderabad, Jamshoro, Attock, Mardan, Peshawar, Kala Bagh, Mansehra, Daddar, Bogharmang, Jaboori, Sachcha, Domel and Jabber areas and 4800 higher plants, 300 samples of algae, 240 samples of fungi and seeds belonging to 15 species of plants were collected.

Laboratory Work

All collected higher plant specimens were mounted on herbarium sheets. Five hundred plants, 100 fungi, 130 samples of algae were identified Sixteen hundred and fifty plants were labelled and 2600 plants were catalogued.

Research

- Experiments were conducted on germination of Ipomoea plants.
- Salt tolerance of mustard was studied.

- experiments were conducted on toxicity of cannabis.

- Studies on "Ecotaxonomical evaluation of valuable plants of Baluchistan" were completed.

- Revision of 100 poisonous plants was completed.

2. EARTH SCIENCES DIVISION.

Reference Collection

Collection of rocks, minerals, and fossils: Geological studies alongwith extensive collection were undertaken in Kalar Kahar, Chingi formation, Khewra, Mianwali, Kussak formation, Tobra formation, Luwah, Baghanwala, Choa Saidan Shah, Katlang, Shamozai, Kabbal, Kishora and Shangla, Gogal, Hunza, Nagar, Gilgit,Passu, Salt Range, Namal gorage, Chidru, Zaluch Nalla, Mansehra, Daddara, Bogharamang, Domel, Joboori, Jabbar and Khaki. These field trips ended up in collection of 1450 sedimentary and igneous/metamorphic rock samples, 260 vertebrate and invertebrate fossils, 750 mineral specimens, 340 stratigraphic samples and 50 stream sedimentary samples.

Laboratory Work

Eighty samples were processed for mineral analysis. Fifty vertebrate fossils were identified. Two hundred and twenty fossils, 60 rock samples, 90 mineral samples and 3 coal samples were catalogued. Washing and picking of Rodent lizards, fishes and ostracodes fossils from sediments were completed. Powder of different samples was prepared for mineral analysis. Three hundred slides were heated for XRD analysis.

Research

Following research studies were completed:-

- Interpretation of Diffractograms about the clays of Khewar Sand Stones.

- Petrographic study of thin sections of Swat and Dir.

- Taxonomic description of Giraffid teeth from Kalar Kahar.

- Revision of fossil mammalian fauna of Dhok Thalian.

- Geological map of Passu area were prepared.

- Comparison of fossils of Muridae with casts of Mus and Golunda carried out.

3. ZOOLOGICAL SCIENCES DIVISION

Reference Collection.

Collection of Fauna: field trips were conducted in Gilgit, Hunza, Nagar, Gojal, Khaiber, Sost, Deh, Nomal, Rahim Abad, Passu, Boreet, Chilas, Swat, Kaghan, Rawli,, Shahargarh, Attock, Ayubia National Park and Islamabad area. Extensive representative samples of vertebrate land invertebrate animals have been collected from these areas. These include 26000 insects, 1200 fishes, 240 reptiles, 100 birds, 30 mammals and 40 specimens of invertebrates.

Laboratory Work

Twelve hundred fishes, 2000 insects, 60 birds, 70 reptiles, 4 mammals and 30 invertebrates were identified and catalogued. Twenty birds and 5 mammals were stuffed.

Research

Following research studies were completed:-

- Data compilation about "Ichthyoecological Zones" of Pakistan.
- Estimation of FSH, LH and prolactation in the plasma samples of mongoose.
- Morphometric studies on the amphibians of Northern Pakistan.
- Data compilation on morphometrics of 80 lizard specimens.
- Studies of "Ichthyofauna of Malakand Division."

4. PUBLIC SERVICE DIVISION

Museum display

Establishment of Display Corner.

A 'DISPLAY CORNER' of Pakistan Museum of Natural History at Marghzar, Islamabad, has been established to display large natural history specimens and exhibits. The centre is now open for public and is being visited by 30,000 to 40,000 persons per month.

Dioramas of Salt Range

Designing of dioramas pertaining to Salt Range has been completed. The structure of dioramas has been fabricated. The work on exhibits is in progress.

Exhisting Display

New specimens of animals, plants, rocks, minerals added/replaced in existing Display and Dioramas of the Museum.

Museum Education.

Arranged 20 Popular Lecturers and Visits of 39 Educational Institutions.

CHAPTER-2

ORGANIZATION AND ADMINISTRATION

The organizational structure of the Pakistan Science Foundation, Pakistan Scientific and Technological Information Centre and Pakistan Museum of Natural History are given on pages No. 66,67,68.

The staff position in the Foundation, PASTIC and PMNH during period is as under:-

S.No.	Designation	Number
1.	Chairman	1
2.	Member (Science)	1
3.	Member (Finance)	1
4.	Chief Scientific Officer	1
5.	Secretary	1
6.	Principal Scilentific Officer	1
7.	Senior Scientific Officer	3
8.	Science Promotion Officer	1
9.	Deputy Secretary	1
10.	Deputy Director (F&A)	1
11.	Administrative Officer	1
12.	Accounts Officer	1
13.	PS to Chairman	1
14.	Librarian	1
15.	Internal Audit Officer	1
16.	Scientific Officer	6
17.	Assistant Scientific Officer	1

18.	Superintendent		1
19.	Accountant		1
20.	Caravan Incharge		1
21.	Graphic Artist		1
22.	PA to Chairman		1
23.	Supporting Staff		74
		Total	103

In addition to the whole-time Staff Members of the Foundation there are about 200 scientists and technologists in various universities and research organizations who are acting in an honorary capacity as reviewers of the research proposals and members of the Technical Committees or Principal Investigator of PSF Supported Projects.

PAKISTAN SCIENTIFIC AND TECHNOLOGICAL INFORMATION CENTRE (PASTIC)

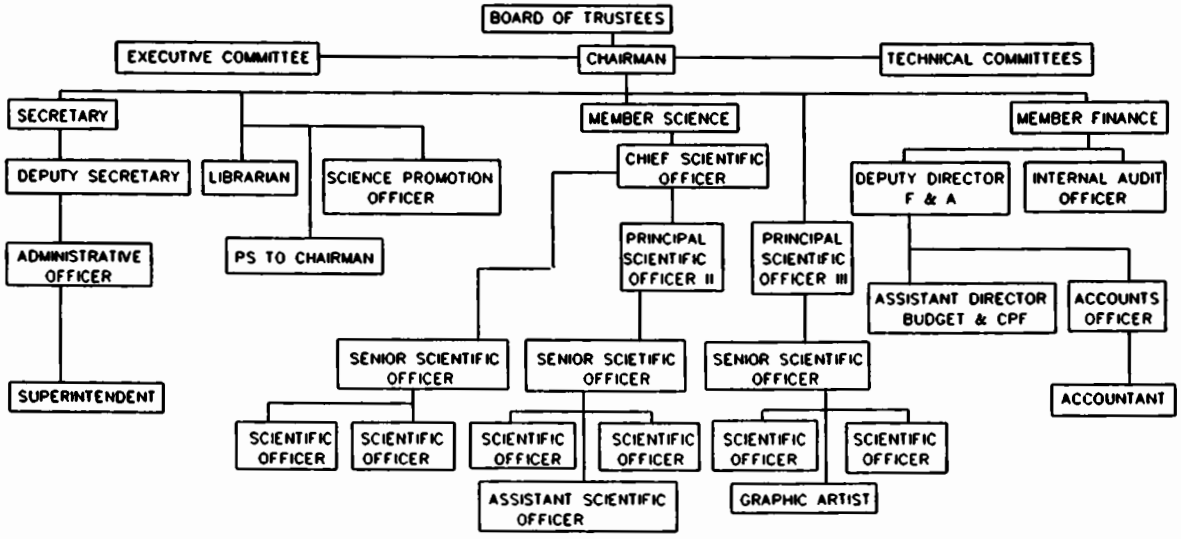
S.No.	Designation	Number
1.	Director General	1
2.	Deputy Director (Doc.)	1
3.	Senior Administrative Officer	1
4.	Senior Documentation Officer	1
5.	Senior Information Officer	1
6	Senior Librarian	1
7.	Senior System Analyst	1
8.	Manager Reprographic Unit	1
9.	Officer Incharge, Karachi.	1
10.	Abstractor	1
11.	Accounts Officer	1
12.	Documentation Officer	1
13.	Superintendent (Doc.)	1
14.	Indexer	1
15	Patent Officer	1
16.	Printing Officer	1
17.	Photographic Officer	1
18.	Administrative Officer	1
19.	Officer Incharge (Quetta & Peshawar)	2
20	Superintendent (Admn.)	1
21.	P.A. to Director General	1
22.	Assistant Accounts Officer	1

23.	Cataloguer Classifier	1
24.	Assistant Programmer	4
25.	Senior Plate Maker	1
26.	Assistant Documentation Officer	2
27.	Supporting Staff	81
	Total:	112

PAKISTAN MUSEUM OF NATURAL HISTORY (PMNH)

S.No.	Designation	Number
1.	Director General	-
2.	Directors	2
3	Curator	1
4	Associate Curators	6
5	Research Associates	22
6	Product Designer	1
7.	Artist	1
8	Administrative Officer	1
9	Accounts Officer	1
10.	Librarian	1
11.	Taxidermists	2
12.	Teacher Guide	1
13.	Superintendent	1
14.	Accountant	1
15.	Supporting Staff	75
	Total:	116

PAKISTAN SCIENCE FOUNDATION
ORGANIZATIONAL CHART



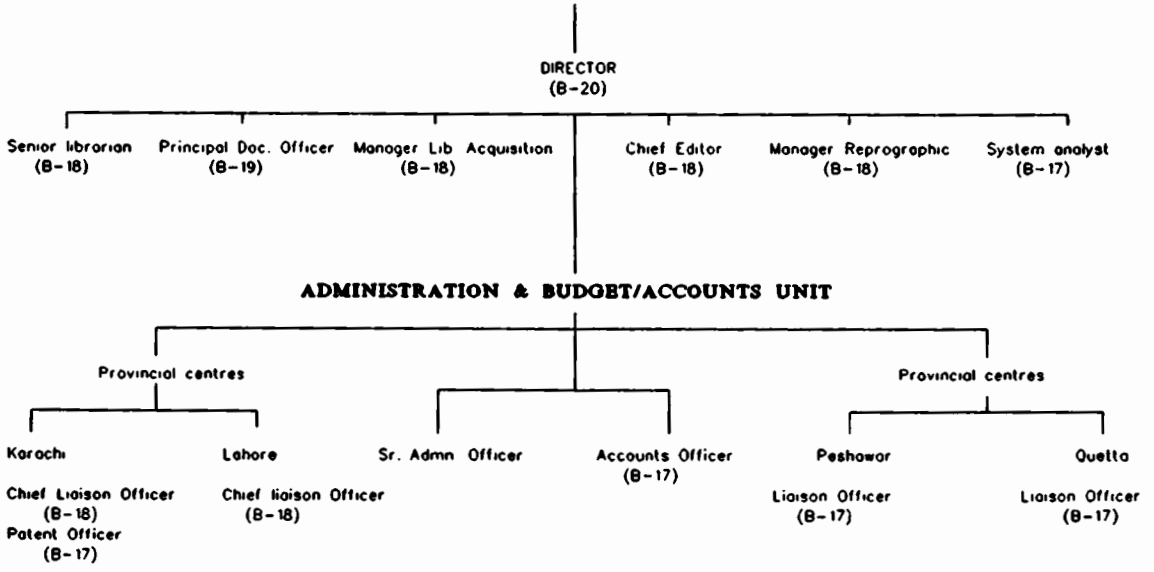
ORGANIZATION CHART

PAKISTAN SCIENCE FOUNDATION

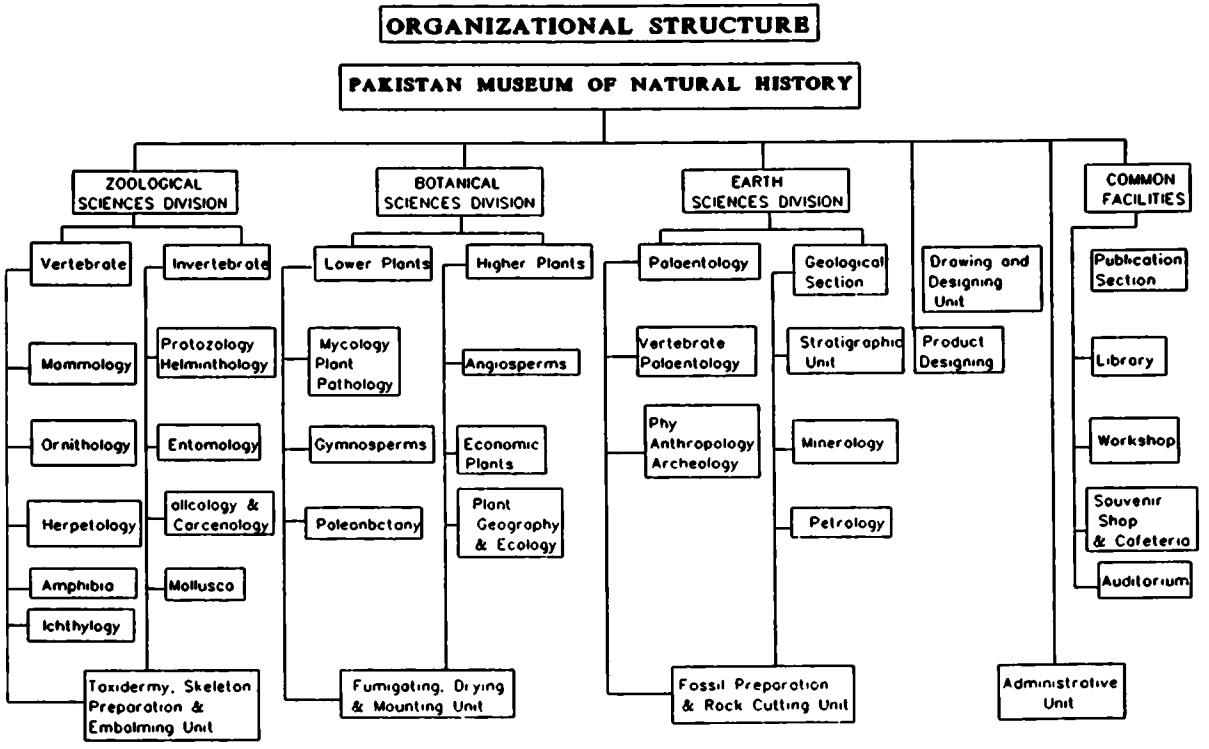
PAKISTAN SCIENTIFIC & TECHNOLOGICAL INFORMATION CENTRE

(PASTIC)

ISLAMABAD



ORGANIZATIONAL STRUCTURE



CHAPTER -3

AUDITORS REPORT

The reports of the Auditors appointed by the Foundation in consultations with the Auditor General of Pakistan are reproduced with respect to Pakistan Science Foundation, and its attached departments. Pakistan Scientific and Technological Information Centre and Pakistan Museum of Natural History.

The names and addresses of the Auditors are :-

Pakistan Science Foundation	Nazir Chaudhri & Co., Chartered Accountants, 2-Gardee Trust Building Napier Road, Lahore-7.
Pakistan Scientific & Technological Information Centre	Akbar & Company Chartered Accountants, Amin Building Shahrah-e-Quaid-e-Azam Lahore.
Pakistan Museum of Natural History	Ilyas Saleem & Co., Chartered Accountants, 18-D, 6th Road, Satellite Town, Rawalpindi.

65793
Phone: 68304
56560

NAZIR CHAUDHRI & CO.

CHARTERED ACCOUNTANTS
2-GARDEE TRUST BUILDING, NAPIER ROAD,
LAHORE-7

AUDITORS' REPORT

We have examined the annexed Balance Sheet of PAKISTAN SCIENCE FOUNDATION as at 30th June, 1988 and the annexed Receipts and Expenditure account for the year ended 30th June, 1988 and report that:-

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

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;

c) The receipts of the Foundation during the year ended 30th June, 1988, comprise of grants received from the Federal Government We are satisfied that the grant so received has been utilized for the objects for which it was made within the specified time limit and that there was no unspent balance except for expenses incurred but not paid upto June, 30, 1988. However, refunds amounting to Rs.159,899/- payable to the Federal Government have been adjusted against General Fund as communicated vide letter No PSF/FIN/4(21)87-88 dated: 10th January, 1990. We are also satisfied ourselves about the properiety of the disbursements made from the grant.

NAZIR CHAUDHRI & CO.
CHARTERED ACCOUNTANTS

PLACE: LAHORE

DATED: 07 JUNE 1990

Nazir Chaudhri & Co.
Chartered Accountants

PAKISTAN SCIENCE FOUNDATION, ISLAMABAD
BALANCE SHEET AS AT 30TH JUNE, 1988

FUNDS & LIABILITIES	NOTE	1988 Rupees	1987 Rupees	PROPERTY & ASSETS.	NOTE	1988 Rupees	1987 Rupees
GENERAL FUND	2	6,287,342	6 774,292	FIXED ASSETS. As per Schedule Annexed		5.651,635	5,834,591
RESEARCH SUPPORTGRANT.	3	21,808,493	51,798,586	RESEARCH PROJECTS IN PROGRESS	6	21,808,493	51,798,586
CURRENT LIABILITIES							
For Expenses.	4	37,133	101,501	CURRENT ASSETS.			
Grant Refundable to Government	5	-	159,899	Accounts Receivable to Government	7	25,000	212,000
				Advances Deposits & Pre-payments	8	577,181	955,684
				CASH AND BANK BALANCES	9	70,659	33,417
		28,132,968	58,834,278			28,132,968	58,834,278

CHAIRMAN TRUSTEE TRUSTEE

AUDITORS REPORT

The above balance sheet should be read in conjunction with the annexed notes and accounts.

PLACE: LAHORE
DATED: 07 JUN 1990

NAZIR CHAUDHRI & CO.

CHARTERED ACCOUNTS

PAKISTAN SCIENCE FOUNDATION, ISLAMABAD
RECEIPTS AND EXPENDITURE
FOR THE YEAR ENDED 30TH JUNE, 1988

EXPENDITURE	NOTE	1988 Rupees	1987 Rupees
Grants	10	5,639,370	6,385,441
Development Grants	11	1,760,000	3,083,524
Travel Grant for Scientific Survey.	12	181,890	452,103
Other Functions	13	1,509.366	765,665
Administrative Expenses	14	5,753,886	5,145,597
		14,844,512	15,834,330
INCOME			
Miscellaneous	15	47,803	1,863
Net expenditure for the year transferred to general fund.		14,796.709	15,832,467

Note:- These above receipts and expenditure account should be read in conjunction with the annexed notes.

CHAIRMAN **TRUSTEE** **TRUSTEE**

Nazir Chaudhri & Co.
Chartered Accountants

PAKISTAN SCIENCE FOUNDATION
SCHEDULE OF FIXED CAPITAL EXPENDITURE AS ON 30TH JUNE, 1988

PARTICULARS	COST					DEPRECIATION				
	AS ON 01.07 87	ADDITION	ADJUSTMENT	AS ON 30 06 88	RATE %	AS ON 01 07 87	ADJUSTMENT	FOR THE YEAR	AS ON 30.06 88	W D V
Lease Hold Land	3.013.919.00	-	-	3,013,919 00	-	-	-	-	-	3,013,919.00
Furniture & Fixtures	602,582 79	7,709.90	-	610,292 69	06	181,873 10	-	25,705.18	207,578 28	402,714 41
Office Equipment	764,981 05	20,175.00	-	785,156 05	15	393,115 11	-	58,806 14	451,921 25	333,234 80
Airconditioners	178,974 00	16,000.00	-	194,974 00	15	100,091 32	-	14,232 40	114,323.72	80,650.28
Motor Vehicle	1,776,587.82	689,016 90	772,615	1,692,989 72	20	755.001 99	312,333.22	250.064 19	692,732.96	1,000,256 76
Science Equipments	969.833.25	-	-	696,833 25	15	190,255 89	-	116,936.60	307,192 49	662,640.76
Library Books & Films	171,816 44	18,514.00	-	190,330 44	05	23,880.15	-	8,322 51	32,202.66	158,127 78
Bicycles	680.00	-	-	680 00	20	565.82	-	22 84	588.66	91,34
	7,479,374.35	751,415.80	772,615	7,458,175.15		1,644,783 38	312,333.22	474,089.86	1,806,540,02	5,651,635.3
	5,853,520.56	1,625,853.79	-	7,479,374 35		1,137,602 11	-	507,181.27	1,644,783.38	5,834,590.97

PAKISTAN SCIENCE FOUNDATION, ISLAMABAD
NOTES TO THE ACCOUNT FOR THE YEAR ENDED 30TH JUNE, 1988

1. ACCOUNTING POLICIES

The principal accounting policies which have been adopted in the preparation of Foundation accounts are as follows:-

GRANT RECEIVED.

1.1 Grant from the Government of Pakistan has been accounted for on receipt basis.

RESEARCH SUPPORT GRANT

1.2 Research Support Grant has been accounted for on payment basis.

FIXED ASSETS

1.3 Fixed Assets have been valued at cost less accumulated depreciation except lease hold land which is valued at cost.

1.4 Depreciation on fixed assets has been charged on reducing balance method.

2. GENERAL FUND

Movement in the account during the year is as follows:-

	1988 Rupees	1987 Rupees
Balance as on Ist July, 87	6,774,292	6,119,235
Grant received from Government of Pakistan during the year.		

	Non Development Grant.		13,001,000	13,404,000
	Development Grant.		1,760,000	3,083,524
			21,535,292	22,606,759
	Less: Expenditure during the year.		14,796,709	15,832,467
			6,738,583	6,774,292
	Less: Amount refund to Government of Pakistan		502,140	-
			6,236,443	6,774,292
		B/f.	6,236,443	6,774,292
2.1	Less: Adjustment made in respect of Accounts receivable from PASTIC.		162,000	-
			6,074,443	6,774,292
	Add: Adjustments made in respect of			
	i. Audit Fee.	53,000		
	ii. Grand Refundable to Government	159,899	212,899	-
			6,287,342	6,774,292

We have been informed by Deputy Director (F&A) vide letter No.PSF/FIN/4(21) 87-88 dated: 10th January, 1990 that the adjustment in General Fund have been approved by the competent authority.

2.2 This amount represents the sale proceed of following four Vehicle:-

	VEHICLE NO.	SALE PRICE.
1.	ID - 5102	365,000
2.	ID - 3365	47,390
3.	ID - 2714	27,500
4.	ID - 1293	62,250
		502,140

3. RESEARCH SUPPORT GRANT

In accordance with the principle out lined in Charter grants aggregating Rs.4,674,368/- have been paid by the Foundation during the year for conducting of various approved scientific research projects as detailed below:-

	1988 Rupees	1987 Rupees
Medical Sciences.	192,011	612,245
Chemical Sciences.	1,203,058	1,887,967
Agricultural Sciences	783,754	339,392
Biological Sciences	463,921	1,147,137
Earth Sciences.	269,073	218,677
Environmental Sciences	13,000	64,465
Engineering Sciences	106,703	121,402
Physical Sciences	1,438,628	276,082
Institutional Support	190,670	317,096
Honoraria.	13,550	14,300
	4,674,368	4,998,763

This balance arrives at as follows:-		
Balance as at Ist July, 1987	**51,798,586**	**46,799,823**
Disbursed during the year.	**4,674,368**	**4,998,763**
	56,472,954	51,798,586
Less: Adjustment made in respect of Research Projects in progress	34,664,461	-
	21,808,493	51,798,586

3.1 In accordance with the provision of the agreement, the grantee has undertaken to insure the grant for the performance and execution of research projects for which the grant has been sanctioned accordingly. These grants are being carried forward in the accounts of the foundation and have been adjusted for completed projects.

4. **CURRENT LIABILITIES**	**1988 Rupees**	**1987 Rupees**
Audit Fee.	53,000	63,000
Other accrued expenses.	37,133	38,501
	90,133	101,501
Less: Adjustment made	53,000	-
	37,133	101,501

5. **GRANT REFUNDABLE TO GOVERNMENT**		
Balance B/f.	159,899	159,899
Unspent Balance relating to grant disbursed.		
During the year.	-	-
For prior year.	195,500	153,590
	355,399	313,489
Less: Grant refunded to the Government during the year.	355,399	153,590
	NIL	159,899

6. RESEARCH PROJECTS IN PROGRESS.

This represents the expenditure incurred on various research projects which appear per contra on the liabilities side under the head "Research Support Grant" and have been adjusted for completed projects.

7. ACCOUNTS RECEIVABLE COMPRISING.	1988 Rupees	1987 Rupees
PASTIC	162,000	162,000
Unesco Coupons.	25,000	50,000
	187,000	212,000
Less: Adjustment made.	162,000	-
	25,000	212,000

8. ADVANCES, DEPOSITS & PREPAYMENTS.	1988 Rupees	1987 Rupees
Advance to Staff.	38,475	72,576
Deposits.	5,500	5,500
Prepayments.	533,206	877,608
	577,181	955,684

9. CASH AND BANK BALANCES.		
In hand.	24,160	18,985
Unesco Coupons.	46,499	14,432
	70,659	33,417

10. GRANTS		
Research Support.	4,674,368	4,998,763
Scientific Societies & Prof: Bodies.	510,000	815,000
Scientific Conference Meeting & Seminars.	455,002	571,678
	5,639,370	6,385,441

11. DEVELOPMENT GRANTS.

This represents the grants-in-Aid received from Aid of National Science Foundation of United States of America Project PL-480 through Government of Pakistan and has been paid to the followings:-

	1988 Rupees	1987 Rupees
University of Peshawar.	-	196,000
University of Punjab.	-	350,000
University of Karachi.	-	450,000
University of Agriculture.	-	1,376,000
Foreign Educational Grant.	-	711,524
Science Caravan.	1,417,000	-
Chromosom.	343,000	-
	1,760,000	3,083,524

12. TRAVEL GRANT FOR SCIENTIFIC SURVEY

Science Conference & Seminars, Local.	181,890	452,103

13. OTHER FUNCTIONS

Science Centre and Herbaria	18,677	495,243
Information and Documentation.	218,505	98,968
Award Prizes and fellowship.	41,000	19,000
International Lisions.	-	8,500
Collection of Statistics.	155,248	143,954
Science Promotion activities	1,075,936	-
	1,509,366	765,665

14. ADMINISTRATIVE EXPENSES.

Salary and other benefits.	3,750,514	2,895,890
Travelling Expenses.	123,000	155,147
Office Rent.	615,011	617,233
Electricity, Gas, and Water,	94,892	75,320
Postage, Telegrams & Telephones	308,500	316,753
Printing & Stationery.	54,154	74,485
Vehicle running & maintenance.	177,094	187,388
Newspapers & periodicals.	24,297	17,927
Liveries and Uniforms.	2,842	9,980
Entertainment.	21,327	84,551
Repair & maintenance	50,157	22,906
Miscellaneous	22,457	23,775
Audit Fee.	15,000	12,500
Advertisement	17,940	9,377
Bank charges.	2,611	3,650
Experts & Consultants.	-	133,534
Depreciation.	474,090	507,181
	5,753,886	5,147,597

15. MISCELLANEOUS INCOME

Interest on advance	5,945	1,863
Profit on disposal of Assets.	41,858	
	47,803	1,863

16. FIGURES.

these accounts have been rounded off to the nearest rupees.

AKBAR & COMPANY
CHARTERED ACCOUNTANTS

MUHAMMAD AKBAR
B. Com. (Hons) F.C.A.

The Chairman,
Pakistan Science Foundation,
P-13, Al-Markaz,
F-7/2,
Islamabad.

SUBJECT:- AUDIT OF BOOKS OF ACCOUNTS OF PAKISTAN SCIENTIFIC AND TECHNOLOGICAL INFORMATION CENTRE, FOR THE YEAR ENDED JUNE 30, 1988

Dear Sir,

We have completed the audit of receipts and payments accounts of Pakistan Scientific and Technological Information centre, Islamabad, Lahore, Karachi, Quetta and Peshawar for the year ended June 30, 1988, and our comments are as under:-

(i) ISLAMABAD CENTRE:

1. GRANTS:

This represents the amount received by the Centre from/Accountant General Pakistan Revenues. The amount allocated and remitted to Sub-Centres is as under:-

Name of Centre	Funds allocated	Funds utilized/ remitted
Islamabad	3,824,184	3,824,184.25
Karachi	566,800	566,799.50
Lahore	206,277	206,377.25
Peshawar	177,789	177,789.00
Quetta	188,950	188,950.00
	4,964,000	4,964,000.00

1.1 Cheque No. 125776 amounting to Rs.10,000 issued by Islamabad Centre on June 10,1988 to Baluchistan University, Quetta, was debited to remittance to Quetta Centre which was not received by the Centre till June 30, 1988.

1.2 Rs. 14,756.00 sent by PASTIC - Islamabad on June 21, 1988 vide Cheque No. 012581-25785 to Peshawar Centre was not received till June 30, 1988.

2. **Electricity Charges:**

Rs. 5,514 paid on January 21, 1988 on behalf of Mr. M.A. Madni (Ex-employee) were charged to electricity expenses. Neither this amount has been recovered nor any resolution/authority not to recover this amount was available.

3. **Reprography Expenses:**

i) Operational expenses of reprography Rs.8,444 were paid in July 1987 out of which supportig evidence is attached for Rs. 8,200 only and balance Rs. 244 being excess paid remain unexplained;

ii) Rs. 72,951.29 were drawn from the Bank Account No 696 - 40 of O.I.C. (Printing and Reprography) on January 21, 1988 maintained with Habib Bank Ltd. Quaid-i-Azam University Branch, islamabad. The account is maintained for specific purpose, withdrawal if necessary requires prior approval of the competent authority but that was not made available for our verification.

4. **Equipment:**

Office equipment of Rs. 8,500 was purchased but supporting evidence attached is of Rs. 8400 and balance Rs. 100 was excess accounted for on September 1, 1987.

5. **B.L.D. Coupons:**

BLD Coupon purchased in October, 1987 and March 1, 1988 amounting to Rs. 49,996 and Rs. 33, 250 respectively but supporting receipts were not available for verification.

6. **Unesco Coupons and BLD coupons:**

Unesco coupons and BLD coupon of $ 2,386.76 and $ 420 respectively, were not physically verified as on June 30, 1988, however, we have relied upon certificates provided by the management of its physical existance.

7. **Reprography Receipts:**

During the course of audit we observed that paper and plate cost was charged from Party whereas on completion of job, PASTIC Centre Islamabad incurred following expenses and we suggest that rates charged from parties should be increased to cover up the cost:-

i. Salaries

ii) Electricity bills

iii) Paper cost

iv) Plate cost

v) Ink purchased

vi) Binding material cost

vii) Repair and maintenance of machinery

viii) Wear and tear

ix) Ribbon for composing

x) Films cost

xi) Fuel

xii) Chemicals

xiii) Toner and developer

xiv) Wastage

8. **Difference:**

Payment side is short by Rs. 580.26 of "Receipts and Payments account".

ii) **SUB CENTRE - LAHORE**

1. **Appoint of Driver:**

Mr Babar Rashid son of Mr. M. Rashid was appointed on January 13, 1987 on adhoc basis for six months but he is still in service and his appointment as permanent employee is not confirmed by the Head Office.

2. **Cash with Bank:**

Bank balance as per bank statement is short by Rs. 70 with that cash book balance and the said difference is being brought forward since July 1, 1982.

iii) **SUB CENTRE - KARACHI**

1. **C.P. Fund Deduction:**

Rs. 309 as C.P. Fund was deducted from the salary of Mr. Mohammad Ayub for the month of July and August 1987 but actual calculation comes to Rs. 319 per month.

2. **Benevolent Fund Deduction:**

Monthly deduction of Benevolent fund are not correct from the following employees:-

Name of Employee	Month	B.F. Deducted	B.F. should be
Non-Gazetted staff			
Mrs. Fariida Anees	July, 1987	32	26
" "	Aug.1987	32	26
" "	Sept.1987	37	26
Mohammad Ayub	Sept. 1987	32	26
Mrs. Farida Anees	Oct. 1987	37	26
Mohammad Ayub	Oct. 1987	32	26

3. **Pakistan Science Foundation Expenses:**

Expenses of Rs. 16,215 35 incurred by P.S.F. Employee at Karachi out of remittance by P.S.F. but these remain unverified in absence of supporting evidence either in original or photocopies.

iv) SUB CENTRE - QUETTA.

1. Salary

1.1. Rs. 1,547.40 were paid to Ayattullah Durrani as arrears but period for which arrear relates was not explained.

1.2 Honorarium to staff, D.D.O. and Ghous Bux amounting Rs. 6,097.38, 1,661.70 and Rs. 1,541 respectively for the month of July and August 1987 were paid but approal by Chairman of PSF was not available as required under law.

2. Travelling and Conveyance:

Advance paid against Travelling and Conveyance to following was directly charged to expenses and no adjustment of the same was made:-

Date	To whom paid	Amount
11.08.1987	Ayattulah Durrani	2,000
01.09.1987	Shams-ul-Haq	2,000
14.05.1988	Ayatullah Durrani	1,000

3. **C.P. Fund, Benevolent Fund, Group Insurance:**

C.P. Fund, Benevolent fund and Group Insurance have not been deposited from September 1987 to June 30, 1988 but the deductions are being made regularly.

4. **Stock Register:**

Stock register was not properly maintained by the Centre.

GENERAL:

1. Ledgers are not being maintained by the Sub-Centres. We suggest for the maintenance of the same.

2. Documentation receipts could not be verified by us in the absence of proper records.

3. Cash in hand as on June 30, 1988 of all the Centres were not physically verified by us, however, we have relied upon certificates of its physically existance provided by the managements.

In the end we want to place on record our thanks to the management and staff for the cooperation extended during the course of audit.

Yours faithfully,

LAHORE: 65-SHAHRAH-E-QUAID-E-AZAM.
DATE 15 APR. 1989

AKBAR AND COMPANY,
CHARTERED ACCOUNTANTS.

AKBAR & COMPANY
Chartered Accountant

PAKISTAN SCIENTIFIC AND TECHNOLOGICAL INFORMATION CENTRE
RECEIPT AND PAYMENTS ACCOUNT FOR THE YEAR ENDED JUNE 30, 1988.

RECEIPTS

	ISLAMABAD	LAHORE	KARACHI	QUETTA	PESHAWAR	TOTAL
OPENING BALANCE:						
Cash in hand	1,006 00	600.00	488 00	-	-	2,094.00
Cash with Bank	24,054.13	167,666.72	51,250 56	16,229.22	137,032.46	396,233.09
UNESCO Coupons in hand	47,173.17	-	-	-		47,173 17
	72,233.30	268,266.72	51,738.56	16,229.22	137,032.46	445,500.26
GRANTS:						
From A.G.P R.	4,964,000 00	-	-	-	-	4,964,000.00
From Science Foundation	-	-	16,215.35	-	-	16,215.35
Other receipt	-	-	50,126 65	-	450.00	50,576 65
Received from PASTIC Islamabad	-	206,277.25	566,799 50	178,950.30	163,033 00	-
Total:	5,036,233.30	374,543.97	684,880.06	195,179.52	300,515.46	5,476,292.26

PAYMENTS

Salary and allowances	2,184,246.52	180,678.74	466,014.68	141,935.65	115,801 43	3,088,677.02
Gratuity	12,980.96	-	-	-	137,032.46	150,013.42
Printing, Stationary and Consumable stores	26,244.40	9,676.10	2,734.00	5,662.50	2,000.00	46,317.00
Postage, Telegram and Telephone Expenses	67,277.00	5,145.90	9,367.90	503.00	225.74	82,519.54
News Papers, advertisement and Publication	9,467.69	1,111.80	415.50	-	638.50	11,633.49
Translation charges	200.00	1,700 00	-	-	-	1,900.00
Freight and Octori	-	17.50	-	-	-	17.50
Entertainment	1,818.98	113.00	-	4,235.00	-	6,166 98
Vehicle running expenses	62,080.39	5,494.25	3,584.90	-	-	71,159.54

	ISLAMABAD	LAHORE	KARACHI	QUETTA	PESHAWAR	TOTAL
Local rates and taxes	-	-	1,959.30	-	-	1,959 30
Bank charges	1,533.30	176 40	353.80	40.00	50.00	2,153.50
Gardening	2,530 00	-	-	-	-	2,530.00
Technological Information Project (T.I.P)	600,000 00	-	-	-	-	600,000.00
Uniform and Liveries	4,908 00	-	100.00	-	-	5,008.00
Office cleaning	-	600.00	-	-	-	600 00
Remittance to Quetta university	10,000 00	-	-	-	-	10,000 00
Remittance to Peshawarin Transit	14,756 00	-	-	-	-	14,756.00
Remittance to Sub Centres	1,115,060.05	-	-	-	-	-
Furniture and fixture	1,165 00	-	-	-	-	1,165.00
Travelling and Conveyance	2,800 50	206.00	12,921 20	5,000 00	249.00	21,176.70
Operational expenses of Computer Unit	19,787 00	-	-	-	-	19,787.00
Telex	-	-	25,207.00	-	-	25,207.00
Purchase of UNESCO Coupons	183,338.00	-	-	-	-	183,338 00
Advances	-	-	11,970 00	-	-	11,970.00
Unforseen expenses	180.00	-	7,516 65	-	-	7,696.65
Electricity, water and Sui gas charges	179,714 00	1,194.60	14,591.61	-	1,565.56	197,065.77
Miscellaneous	-	333.55	-	1,300.00	2,024.03	3,657.58
Reprography expenses	130,002.50	-	-	-	-	130,002.50
Refund to P.S.F.	-	100,000.00	-	-	-	100,000.00
Medical charges	143,547.92	14,418.70	60,772.10	-	433.00	219,171.72
House Rent	-	-	-	11.600 00	-	11,600.00
Hot and Cold charges	-	219.00	-	-	-	219.00
Repair and maintenance of vehicles	-	115.50	-	4,700.000	415.00	5,230.50
Repair and maintenance of equipments	28,931.80	12,037.52	7,954.00	3,127.00	-	52,050.32
Repair and maintenance of building	18,673.54	-	1,901.00	-	-	20,574.54
Welfare fund	9,250.00	-	2,110 00	-	-	11,360.00
Staff Building rest	123,017.79	-	20,000.00	-	-	11,360.00

	ISLAMABAD	LAHORE	KARACHI	QUETTA	PESHAWAR	TOTAL
P.S.F. expenditure	-	-	14,858.00	-	40,000.00	183,017.79
Purchase of Books	941.00	822.50	-	-	-	14,858.00
Purchase of Equipments	8,500 00	-	-	-	-	8,500.00
Differarence	580 26	-	-	-	-	580.26
TOTAL:	4,963,532 60	334,061.06	178,103.15	664,331.64	300,434.72	5,325,403.12
CLOSING BALANCE:						
Cash in hand	1,473 40	500.00	1,500 00	-	-	3,473.40
Cash with Bank	24,054 13	39,982.91	19,048 42	17,076.37	80.74	100,242.57
UNESCO coupons in hand	47,173.17	-	-	-	-	47,173.17
	72,700 00	40,482.92	20,548.42	17,076.37	80,74	150,889.14
TOTAL:	5,036.233 30	374.543.97	684.880.06	195,179.52	300,515.46	5,476,292.26

LAHORE:65-SHAHRAH-E-QUAID-E-AZAM
DATE:15 APR 1989

AKBAR & COMPANY
Chartered Accountant

PAKISTAN SCIENTIFIC AND TECHNOLOGICAL INFORMATION CENTRES: GOVERNMENT RECEIPTS AND PAYMENTS ACCOUNTS FOR THE YEAR ENDED JUNE 30, 1988.

RECEIPTS

	ISLAMABAD	LAHORE	KARACHI	QUETTA	PESHAWAR	TOTAL
Closing Balance						
Cash in hand	9.90	-	-		-	9.90
Cash with Bank	483,497.53	13,862.55	28,113.79		4.00	525,477.87
						525,487.77
Receipts:						
Documentation receipts	770,039.53	44,315.90	20,872.39		8,416.00	843,643.82
Reprography receipts	32,479.61	-	-		-	32,479.61
	1,286,026.57	58,178.45	48,986.18		8,420.00	1,401,611.20

PAYMENTS

Reprography expenses	703,370.06	-	-		-	703,370.06
Bank charges	-	48.00	-		-	48.00
Transfer in Government Treasury Account.	-	58,000.00	48,900.00		7,858.00	114,758.00
Closing Balances:						
Cash in hand	9.90	-	-		-	9.90
Cash with Banks	582,646.61	130.45	86.18		562.00	583.425.24
	582,656.51	130.45	86.18		562.00	583,435.14
	1,286,026.57	58,178.45	48,986.18		8,420.00	1,401,611.20

LAHORE:65-SHAHRAH-E-QUAID-E-AZAM
DATE: 15 APR 1989

AKBAR & COMPANY
CHARTERED ACCOUNTANTS

MUHAMMAD AKBAR
B. Com. (Hons) F.C.A.

The Chairman,
Pakistan Science Foundation,
P-13, Al-Markaz, F-7/2,
Islamabad.

SUBJECT: AUDIT OF BOOKS OF ACCOUNTS OF PAKISTAN SCIENTIFIC AND TECHNOLOGICAL INFORMATION CENTRE FOR THE YEAR ENDED JUNE 30, 1988.

Sir,

Reference to our meeting with Deputy Director, Finance and Accounts, Pakistan Science Foundation from February 9, 1991 to February 11, 1991, regarding short comings/observations pointed out in the previous report and we detail that the following information/short comings in our report have been clarified as under:-

i) **KARACHI CENTRE:**

1. **C.P. FUND DEDUCTION:**

Rs. 309 as C.P. Fund was deducted from the salary of Mr. Mohammad Ayub for the month of July and August 1987 but actual calculation comes to Rs. 319 per month which has been corrected.

2. **P.S.F. EXPENSES:**

Expenses of Rs.16,215.35 incurred by P.S.F. Employees at Karachi out of remittances by P.S.F. It has been explained that those expenses are of P.S.F. and has been accounted for in P.S.F. Books of Accounts.

Yours faithfully,

LAHORE: 65-SHAHRAH-E-QUAID-E-AZAM
DATE: FEBRUARY 11, 1991.

AKBAR AND COMPANY
CHARTERED ACCOUNTANTS

AKBAR & COMPANY
CHARTERED ACCOUNTANTS

MOHAMMAD AKBAR
B.Com (Hons) F.C.A.

The Chairman,
Pakistan Science Foundation,
P-13, Al-Markaz,
F-7/2,
Islamabad.

SUBJECT:- AUDIT OF BOOKS OF ACCOUNTS OF PAKISTAN SCIENTIFIC AND TECHNOLOGICAL INFORMATION CENTRE FOR THE YEAR ENDED JUNE 30, 1988.

Sir,

As per telephonic conversation by the Director Miss Azra Sultana, we deputed our staff to verify the short comings/observations pointed out in the previous report and we detail that the following information/short comings in our report have been clarified as under:-

i) **ISLAMABAD CENTRE:**

1. **GRANTS:**

1.1. Cheque No.125776 amounting to Rs 10,000 issued by Islamabad Centre June 10,1988 to Baluchistan University, Quetta was debited to remittance to Quetta Centre which was not received by the Centre till June 30, 1988 This entery was rectified on June 16, 1988 by debiting Rs.10,000 to the Treasurer, University of Baluchistan, Quetta.

1.2. Rs.14,816 sent by PASTIC - Islamabad on June 21, 1988, vide Cheque No.01258 - 125785 to Peshawar Centre was received in the month of July, 1988.

3. **REPROGRAPHY EXPENSES:**

i) Operational expenses of reprography Rs. 8,444 were paid in July 1987. Supporting bill/cash memo for Rs.8,444 were provided for our verification.

ii) Rs.72,951.29 were drawn from the Bank account No.696-40 of O I C (Printing and Reprography) on January 21, 1988 maintained with Habib Bank Ltd. Q.A.U. Branch, Islamabad. The account is maintained for specific purpose, withdrawal of the same was made by the approval of Director General - PASTIC. This amount was deposited back in the respective account on January 28, 1988 vide pay in slip No.08916.

4 **EQUIPMENT:**

Office equipment of Rs.8,500 was purchased but supporting evidence attached is of Rs.8,400 and the balance of Rs.100 was received in the month of July, 1988.

5. **BLLD COUPONS:**

BLLD coupons were purchased in October 1987, vide receipt No.525860 of British Council dated October 5, 1987 for Rs.49,996 and for Rs.33,250 vide receipt No.526,286 of British Council dated March 7, 1988.

ii) **SUB - CENTRE, LAHORE**

1. Mr. Baber Rashid son of Mr. M. Rashid was appointed on January 13, 1987 on adhoc basis for six months. It was explained that Mr. Baber Rashid has resigned on July 21, 1989.

Yours faithfully,

LAHORE: 65-SHAHRAH-E-QUAID-E-AZAM:
DATE: SEPTEMBER 4, 1990

AKBAR AND COMPANY
CHARTERED ACCOUNTANTS

ILYAS SALEEM & CO.

The Chairman
Board of Trustees,
Pakistan Museum of Natural History,
Islamabad.

July 18,1989

re: AUDIT REPORT OF ACCOUNTS JUNE 30, 1988

Dear Sir,

Our comments emanating from Audit are as follows:-

1. An amount of Rs.4,294,004.47/- was advanced to CDA for the construction of Museum Building.We are unable to satisfy ourselves regarding the terms and conditions of this advance.However, reportedly there exist no agreement for the same.

2. Physical verification of fixed Assets was not carried out.

3 Fixed assets register was not maintained properly and store items were not physically verified.

4. It is generally observed that the transport of Pakistan Museum of Natural History are not used properly, requisition slip/form are not filled before the use of transport. Log books of vehicle are not maintained/checked properly by the concerned officer.

5. Cash in hand was not physically verified by us on the terminal date however, the management has certified the balance as on June 30, 1988.

Very truly Yours

(MOHAMMAD SALEEM)

ILYAS SALEEM & CO.

CHARTERED ACCOUNTANTS
INTERNATIONALLY MIDSNELL

18-D, 6th Road, Satellite Town,
P.O.Box No.1731
Rawalpindi
Tele:845318
Telex. 54028 SPK PK (Attn)
Cable: MIDSNELL Rawalpindi

MOHAMMAD ILYAS
C.A.,M Com.,LL.B., FCA
MOHAMMAD SALEEM
B.Sc., FCA

The Chairman,
Board of Trustees,
Pakistan Museum of Natural History,
Islamabad.

re: PAKISTAN MUSEUM OF NATURAL HISTORY

Dear Sir,

Please to report that we have completed the audit of the books of account for the year ended June 30, 1988 We now enclose four copies of Receipts and Payments Account of Pakistan Museum of Natural History together with our report thereon, duly initialed by us for identification purposes We shall be pleased to sign our report after these accounts have been considered and approved by the Board of Trustees and signed by atleast two members of the Board authorised in this behalf.

Very truly Yours,

(MOHAMMAD SALEEM)

RAWALPINDI 18-7-1989.

ILYAS SALEEM & CO.

AUDITOR'S REPORT

We have examined the annexed Receipts and Payments Accounts of Pakistan Museum of Natural History for the year ended June 30, 1988 and we report that:-

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

b) In our opinion and to the best of our information and according to the explanations given to us the Receipts and Payments Account which is in agreement with the books of Accounts,give a true and a correct view of the state of the "Museum's affairs as at June 30, 1988.

ILYAS SALEEM & CO
(CHARTERED ACCOUNTANTS)

RAWALPINDI 18-7-1989

PAKISTAN MUSEUM OF NATURAL HISTORY, ISLAMABAD

RECEIPTS AND PAYMENTS ACCOUNT (RECURRING ACCOUNT) FOR THE YEAR ENDED JUNE 30, 1988

RECEIPTS	1988 (Rs.)	1987 (Rs.)
Opening Cash in hand	8,027	13,501
Cash at Bank	6,406	19,046
	14,433	32,547
Grants	4,662,000	4,602,000
Pakistan Science Foundation	_	27,000
Insurance Claim	_	7,813
Miscellaneous Receipts	1,652	7,276
	4,678,085	4,676,636
PAYMENTS		
Salaries & Allowances	2,459,562	2,498,084
Rent Office Building	604,776	560,176
Rent Residential Building	298,308	399,363
Entertainment	12,449	17,309
Newspapers & Magazines	7,318	5,907
Telephones	108,396	127,451
Electric Gas and Water charges	134,169	120,237

Advertisement & Publicity	4,524	10,905
Postage and Telegram	1,851	3,347
Medical charges	278,907	211,646
Audit Fee	4,000	4,000
T.A./D.A.	35,033	98,858
Printing, Stationery, Consumable Stores	101,041	194,086
Pol, Repair & Maintenance of Vehicles	91,797	127,828
Repair & Maintenance of office equipment	14,711	6,214
Overtime	11,074	8,756
C.P.Fund Contribution	191,005	188,235
Group Insurance Contribution	4,839	-
Office Equipment	74,325	24,578
G.L.I. Contribution	34,732	6,191
Gratuity Contribution	137,656	1,069
Furniture & Fixture	29,356	24,239
Deputation Pay	4,568	2,520
Ground Rent (C.D.A.)	4,300	1,750
Bank Charges	-	20
Field Work Expenses	-	8,611
C.P.F. Final Payment	-	1,309
Misc. Expenditure	11,575	9,514
	4,660,272	4,662,203

CLOSING BALANCE

Cash in hand	9,755	8,027
Cash at bank	8,058	6,406
	17,813	14,433
	4,678,085	4,676,636

ILYAS SALEEM & CO.
(CHARTERED ACCOUNTANTS)

RAWALPINDI 1989

PAKISTAN MUSEUM OF NATURAL HISTORY, ISLAMABAD

RECEIPTS AND PAYMENTS ACCOUNT OF (DEVELOPMENT PROJECT)
FOR THE YEAR ENDED JUNE 30,1988

RECEIPTS	1988 (Rs.)	1987 (Rs.)
Development Grant	5,600,000	4,000,000
Foreign Exchange Grant	–	–
(For import of Scientific Equipt)	1,500,000	1,275
	7,100,000	5,275,00
PAYMENTS		
Purchase of Vehicle	–	398,00
Laboratory Equipment	370,938	277,876
Books and Journals	36,138	119,875
Advance to CDA for Construction of Building	4,294,004	2,850,000
Advance to PEPAC	308,087	162,891
Salaries	484,332	50,925
POL	46,175	23,100
Insurance Premium	12,785	6,654
Display Centre	47,541	99,473
Renewal Fee of Vehicle	–	11,046
Bank Charges	–	160

Expenses Against Foreign Exchange Grant	-	-
Import Science Fee	19,740	49,936
L.C.Margin	1,480,260	1,225,064
	7,100,000	5,275,000

ILYAS SALEEM & CO.
(CHARTERED ACCOUNTANTS)

RAWALPINDI 1989

Annexure-I

PAKISTAN SCIENCE FOUNDATION ACT 1973

National Assembly of Pakistan
Islamabad,
the 2nd February, 1973

The following Acts of the National assembly received the assent of the President on the 31st January, 1973 and 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 of 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 provision of this Act, to acquire, hold and dispose of property, both movable and immovable, and shall be the said name use and be used

(3) The Head Office of the Foundation shall be at Islamabad.

4. **FUNCTIONS OF THE FOUNDATION:-**

(1) The Foundation shall function as 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 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 of technology in particular;

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

(vii) the exchange of visit 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 a 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. **TERMS 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. **MEETING OF THE BOARD:-**

(1) The meeting 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 the Chairman or the Executive Committee such of its power and functions as it may consider necessary.

12. **ADHOC COMMITTEES:-**

The Foundation may set up adhoc 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 edowments; and

(c) income from other sources.

14. **BUDGET:-**

The Foundation shall cause to be prepared and approve a statement of its receipt and expenditure for each financial year.

15. **ACCOUNTS AND AUDIT:**

(1) The funds of the Foundation shall be kept in a present 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 with in 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 maybe, confirm 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 accuring 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.

MEMORANDUM OF UNDERSTANDING OF COLLABORATION BETWEEN PAKISTAN SCIENCE FOUNDATION AND ROYAL SOCIETY OF LONDON

Recognizing the mutual benefit of scientific interchange and the convenience of set procedures for its administration, the Pakistan Science Foundation and the Royal Society of London, hereinafter called the Sides, conclude the following Memorandum of Understanding.

I. Scientific contacts

Both Sides will do all in their power to facilitate collaboration between specialists in the scientific disciplines within their mutual competence.

II. Exchange visits

In each year commencing Ist April,the Sides will organize and finance visits in each direction by research scientists of postdoctoral or equivalent status in pure and applied fields in two categories:

(a) Study Visits:- Usually for short periods of from one to four weeks, to a total of four person-months on either Side,with the aim of visiting a number of laboratories or field study visits in the host country for discussions and liaison; and

(b) Fellowships:- Usually for longer periods to carry out research projects or learn new techniques predominantly in one laboratory or site but with provision for short subsidiary visits to others.

IV. Selection and proposal of visitors

The sending Side will be responsible for selecting and nominating visitors from that country to the host Side; but the host Side may suggest the particular scientists or subjects should be considered by the sending Side,when the work to be undertaken in the host country relates to a joint project, or will be especially valuable in the furtherance of scientific collaboration.

Nominations will be made on standard forms of proposal as may be agreed by the Sides.

Nominations are to be forwarded to the host Side in sufficient time for at least three months notice to be given in each case Not later than two months following receipt of a nomination, the receiving Side is to inform the sending Side as to the acceptability of the proposed visit,the suggestions for the programme and the period of the visit. A provisional programme should be sent as soon as possible for the visitor's information and approval, the sending Side should cable travel details at least a week in advance of the visitor's arrival.

Once a nominated scientist has been accepted for a visit, the receiving Side will take all appropriate steps to facilitate the issue of necessary visa/work or residence permit etc.

V. **Attendance at meetings**

Although the purpose of visits under Article II should not primarily be attendance at conferences, etc., such attendance may be included within a visit if both Sides agree.

VI. **Joint Projects**

Both Sides will encourage joint scientific research between laboratories in the two countries including the conclusion of inter-institutional agreements where this is necessary.

VII. **Medical treatment**

Emergency medical treatment will be available to visitors in accordance with the Laws of the country concerned.

VIII. **Validity of Agreement**

This Memorandum of Understanding shall enter into force upon signature and shall remain in force for a period of five years thereafter, unless terminated earlier by either Side. Notice shall be given at least 60 days prior to the desired termination date by notification in writing from one Side to the other.

In witness hereof, the undersigned, being duly authorized, have signed this Memorandum of Understanding.

Done at London, this 15th day of September 1981

PAKISTAN SCIENCE FOUNDATION

ROYAL SOCIETY OF LONDON

THE ROYAL SOCIETY

Finance arrangements for visits under the Memorandum of Understanding between the Royal Society of London and the Pakistan Science Foundation

Study Visits under Article II(a) will generally be on the basis of the sending Side paying international fares and the host Side local costs, whereas Fellowships under Article II(b)will be entirely at the expense of the sending Side

Study Visits

Accommodation

The host Side will reserve and pay directly for the visitor's occupation of the room with use of bath or shower in a hotel, college, hostel or other suitable establishment for the period of the visit.

Maintenance

Additionally the visitor will be paid in advance an allowance of £12 p.d. in the United Kingdom and Pak Rs.250 in Pakistan for meals not included in the price of the accommodation and for incidental expenses (including bus and petty transport costs).

Travel

For other local travel visitors will be given pre-paid tickets or, where this is impracticable, such expenses will be reimbursed retrospectively

Conference fees

At the request of the sending Side the host Side will pay the fees for attendance at meetings under Article V.

Accompanying dependents

Accompanying dependents will be at the expense of the visitors concerned. However, if requested in good time, the host Side may help by reserving economically priced double rooms, making extra provision for local travel, etc. on the understanding that the extra cost will be repaid by the visitor.

Fellowships

Although Fellowships under Article II(b) will be entirely at the expense of the sending Side, the host Side, if required may help with accommodation by making enquiries and reservations on behalf of the sending Side, providing information on availability, cost, etc. either to the sending Side, or directly to the visitor.

Done in London on 15 September 1981.

For the Royal Society of London

(Signed) _____

Sir Arnold Burgen

(Title) Vice-President

For the Pakistan Science Foundation

(Signed) _____

Dr. M.D. Shami

(Title) Chairman