Pakistan Science Foundation

ANNUAL REPORT 1981 82

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PAKISTAN SCIENCE FOUNDATION
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LETTER OF TRANSMITTAL

Islamabad

Dear Mr. Secretary

I have the honour to enclose herewith Ninth Annual Report of the Pakistan Science Foundation for the Fiscal Year 1981-82, 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,

(Dr. M. D. Shami)
Chairman
Pakistan Science Foundation

Secretary,
Ministry of Science & Technology,
Government of Pakistan,
Islamabad.

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. M. S. Zahid	Member (Science)
Mr. S. M. Afzal	Director/Member Finance

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ANANEXURES:-

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
HC	Government College, Haripur.
PU	Peshawar University/Punjab University
SU	Sind University
KMC	Khyber Medical College
NHL	National Health Laboratories
CSIR	Council of Scientific and Industrial Research
JPMC	Jinnah Post Graduate Medical Centre
NIAB	Nuclear Institute for Agriculture & Biology

Disciplines

AGR	Agricultural Sciences
BIO	Biological Sciences

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

INTRODUCTION

The Pakistan Science Foundation since its inception in 1973 under an Act of the National Assembly, has endeavoured within its limited resources, to strive for the promotion and progression of Science and Technology for the speedy socio-economic development of the nation. Its establishment as an alternate source of funding is a recognition of the vital importance of Science & Technology in the forward march of the nation to self reliance in solving the hard pressed needs in developing agriculture, engineering, medicine and energy resouces.

The Foundation is also the fulfilment of a cherished desire of the scientific community in the country which has been working under difficult conditions. Some of the problems faced by it, are shortage of qualified/trained manpower, dearth of uptodate literature, non availability of most modern and sophisticated scientific community internationally. Non-appreciation of the Society, of the vital role of Science and Technology in national development, has been quite discouraging. In order to help the Scientists/Technologists to overcome their difficulties as well as to create awareness among the masses regarding Science and Technology, and organization with sufficient authority and financial resources, such as the Pakistan Science Foundatin was the need of the time.

The Pakistan Science Foundation was established on June 30, 1973 under the Pakistan Science Foundation Act III of 1973 (Annexure-1) as a financial agency for:-

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

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

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

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

v) the development of learned bodies, scientific societies, associations and academies engaged in spreading the

cause of scientific knowledge in general or in the pursuit of a specific discipline or technology in particular;

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

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

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

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

b) The Foundation was also charged with the responsibility to:-

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

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

iii) cultivate liaison with similar bodies in other countries.

The achievements made by the Foundation during the performance of above statutory functions are described in the ensuing chapters.

CHAPTER-1

ACTIVITIES AND PROGRAMMES

The salient features of the progress made by the Foundation during 1981-82 in the discharge of the functions entrusted to it under the Charter, is summarised below:-

I. ESTABLISHMENT OF THE PAKISTAN SCIENTIFIC AND TECHNOLOGICAL INFORMATION CENTRE (PASTIC)

1. PASTIC Permanent Building

Construction was completed of the structural components including R.C.C. columns, beams, roofs, floors of the ground first and top floors during the year under report. Masonary work,plastering of all the floors was fully finished.1,500 cu.ft.wood was utilized in making wooden frames of the doors and windows. Parapet walls was also constructed. Roof on the library part of the building was also laid. Construction of R.C.C. wall beside the stairs from ground level to the top was completed. Electric pipes and sewerage lines were laid. Two meetings were held with Pak P.W.D. authorities whose attention was drawn for stepping up the pace of construction to completion.

2. Document Procurement and Supply Service

Three thousand nine hundred and eleven (3,911) fresh requests were received from different S & T organizations, industries,. universities, other academic and research institutes and the individual scientists during the fiscal year under review. All the above orders received were processed, acknowledged and placed with the internal and external information supplying agencies and cooperating libraries. The outgo of two thousand eight hundred and thirty nine (2,839) documents consisting of periodical articles,NTIS reports,bibliographies translations,patent specifications etc.were procured and supplied to the requesters. The output comprised ninety six thousand nine hundred and ninety nine pages in total. Regarding the printing output, one lac ninety three thousand one hundred and fifty two (1,93,152) impression was printed out against 32 varying jobs. The number of pages copied on the Plain Paper Copier is 60,787 for a total of 1153 jobs. A statistical data table depicting input and output on documentation and information services for the period reviewed is appended at page 8.

3. National Technical Information Service (NTIS) USA

Seventy five (75) U.S. Research and Development Reports on a variety of S&T problems were obtained from NTIS and catered

to end-users during the period under review. Seventeen NTIS reports which contained comprehensive information on Solar Technology were provided to the requester.Apart from this,AMTID catalogues notifying NTIS latest research work on variegated S&T topics were disseminated to the relevant R&D institutions in the country to keep the scientists, engineers, technologists and enterpreneurs abreast with the current research potential in the specific field of interest.

4. Pakistan Science Abstracts

347 papers were scanned from domestic S&T journals and abstracted for the publication of Abstracting and Indexing journal of PASTIC viz Pakistan Science Abstracts during the period under review. Composing of the abstract manuscripts was rendered in 150 pages. In addition, 355 periodical articles were abstracted for subsequent volumes.

5. Pakistan Current Contents

PASTIC indexing journal entitled Pakistan Current Contents (Science and Technology) was published out covering the period from March to April, 1981 volume No.3 issue No.3-4.

6. Special Bibliography on Cancer

A comprehensive bibliography containing 851 references on Cancer was compiled by PASTIC keeping in view the increasing occurrences of the disease in Pakistan. Each entry is provided with location markings to enable the user to access to the needed information from the Pakistani libraries. Apart from this, the Centre supplied five computer-produced bibliographies on such topics as soil reclamation, water quality for plant growth, salinity/ fertility interactions, blood groups vs diseases and agronomic study on crops.

7. Information Service on Islam and Science

PASTIC obtained following publications from abroad and provided them to Research Unit for Science and Islamic Polity of the National Council for Science and Technology, Islamabad.

i. A history of science and its relations with philosophy and religion by W.C. Dampier. Cambridge University Press, 1979, 1-544.

ii. Science and Civilization in China by Joseph Needham, Published by Cambridge University Press, 1979, p.1-318.

iii. History of the Islamic peoples by Caul Brookelmann, published by Howledge and Kegun Port, London, 1979, p.1-582.

iv. Science and Civilization in China, Vol. 1, 325p.

v. A history of Science and its relations with Philosophy and religion. Parts 1-11, 1440p.

vi. Science and Technology and the Future Vol. I&II.

vii. History of Science by George Sarton, Vol. I From Homer to Omar Khayyam Vol.II. Pt.I&II from Rabbi Ban Ezra to Roger Becon Vol.III. Pt. I&II. Science learning in the 14th century.

8. Translation

Translation of eleven S&T papers was rendered from such foreign languages as Russian, German and French into English and supplied to the customers working in different R&D institutions in Pakistan. The translated texts consisted of 106.5 pages containing about 32,000 words.

9. Patent Information

One hundred and seventy eight patent specifications were supplied to industrial information consumers during the period under review. Apart from this, index lists of patents on sixty (60) different industrial and technological topics were compiled and furnished to entrepreneurs,technologists,technocrats and engineers.

10. Information on Appropriate Technology

PASTIC procured on its initiative vital information material keeping in view the frequent needs of the appropriate technologies. The information was related to such areas as wind energy and solar energy applications, designs of water pumping wind mills, photo-voltaic, power system, rural water supply system, appropriate building materials, solar grain drying systems etc. The information materials were provided to Appropriate Technology Development Organization (ATDO), Islamabad, PCSIR Labs., Karachi and also to a few relevant R&D institutions in the country.

11. Current Awareness Service

Current information was collected from pertinent sources on the following subjects and disseminated to relevant R&D organization in anticipation of their information requirements.

i. Natural resources, energy and demographic studies pertaining to 37 Muslim countries.

ii. Extraction of Rare gases by liquefaction of Air.

iii. Water-cooler based on Solar Energy.

iv. Single cell protein Technology

v. Design of cold storage facility on the basis of Solar Passive Cooling.

vi. Solar grain drying system for Wheat

vii. Taxonomical studies on grass-hoppers and locusts.

12. Educational Information for Task Force of National Academy of Higher Education, UGC

PASTIC obtained and supplied a great deal of data and information to the Task Group of NAHE of University Grants Commission on theses, doctoral dissertations, published research papers, reports monographs that have emanated during 1979-81 from the following institutions.

i. University of Sind, Jamshoro.

ii. University of Peshawar

iii. University of Agriculture, Faisalabad

iv. University of Punjab, Lahore

v. University of Engineering & Technology, Lahore

vi. Allama Iqbal Open University, Islamabad

vii. PCSIR Labs., Lahore.

viii. Government Industrial Research Laboratory, Lahore.

13. National Science Reference Library

Seven hundred and fifty five (755) non-book material items including primary and secondary S&T journals, bibliographies and indexes were acquired for the library during the period under review. In addition entries for 110 volumes of subject and language dictionaries were made. 255 volumes of different encyclopaedias were allotted classification numbers according to Universal Decimal Classification scheme.

14. PASTIC Seminar on Science and Technology Information System at University of Sind, Jamshoro

Fifth seminar of the series on Impact of S&T information system on Research and Development of Pakistan was held on 25 October, 1981 in the auditorium of the Institute of Sindhology at the University of Sind, Jamshoro. The seminar was inaugurated by the chief guest Prof. M. E. Abro, Vice Chancellor, University of Sind and Welcome address was presented by Dr. M. D. Shami, Chairman, Pakistan Science Foundation. Following papers were contributed in the seminar.

i. Dr. Rias Ahmed (Chairman, Deptt. Geology) Role of Existing S&T Information services and systems.

ii. Dr. Mirza Amjad Baig (Dean, Faculty of Arts) Status and generation of information vis-a-vis demand of information.

iii. Miss Zeenat Aslam (Librarian, National Centre of Excellence for Analytical Chemistry). Application of computer in processing retrieval and storage of information.

iv. Mr. Moinuddin Khan (Librarian, Sind University) New world information order is a necessity for the developing countries and less developed countries.

v. Mr. A. R. Butt (Incharge, Deptt. Library Science) Importance and use of bibliographies and bibliographical services.

vi. Mr. Mahtab Ahmad Zuberi (Librarian, Mehran University of Engineering and Technology). Usefulness and utilization of international information systems like AGRIS, UNEP/INFOTERRA MEDLARS NTIS etc.

vii. Dr. A. R. Mohajir (Project Director, PASTIC) Patent information contribution to the economic development of the country.

A large number of scientists, librarians and academics participated in the deliberation of the seminar.

15. Promotion of Technical Officers

Six technical officers were promoted from Grade-17 to Grade-18 on the basis of their seniority cum fitness and merit

PROGRESS REPORT TABLE FOR 1981 – 82

Period	Orders Received	Orders Processed.	Orders Supplied	Photo-copies supplied	NTIS Report	P.S.A. Abstracts	Biblio-References	Translation words	Patent specifi-cation	Library mate-rials recei-ved	Duplicated pages on copier	Printed impres-sions.
July 1981 to June 1982	3911	3911	2839	96,999	75	682	1,099	32000 (106.5 pages)	178	755	60,787	1,93,152

by the Selection Board in accordance with the provisions of the approved Revised Project.

16. Visit of Adviser to the President of Pakistan on Science and Technology to PASTIC Sub-Centre, Karachi

In order to meet Dr. M. A. Kazi, Scientific Adviser to the President of Pakistan, a gathering of distinguished scientists technologists, engineers and decision makers who were 150 in number was organised by PASTIC at its Karachi Sub-Centre on 25th July, 1981. The meeting was addressed by the President's Adviser who lauded the role of PASTIC for adequately meeting the information needs of the Pakistani scientific technical and industrial community and stressed the need for further strengthen its services and product in those vital areas of science, technology and industry which were of capital importance for Pakistan's well-being.

II. 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 carries out its statutory responsibility for the support of scientific research through a number of programmes, which include:-

(a) Grants 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.

(c) Support for participation in regional and international research programmes.

A) *Grants of Research Projects Submitted by Individual Research Workers or Groups of Scientific Workers*

Research Support is the Foundation's principal programme for the promotion of basic and fundamental research, having relevance to the socio-economic needs of the country.

During the period under report, 36 projects costing Rs.4.927 million were received by the Foundation. Whereas 57 projects proposals which had been at the various stages of their processing, were carried over from the previous year. Thus, in all, 93 proposals remained under active consideration of the Foundation during the period 81-82. These proposals were examined by experts in the relevant fields in the light of their scientific merit and relevance to national needs according to the criteria laid down by the Foundation. The criteria for research are (a) competence of the scientific personnel available to carry out the research; (b) Institutional capability i.e., availability of requisite equipment, library facilities and support from scientific colleagues (c) scientific merit of the proposed research (d) likelihood of completion of the project within the stipulated time. Each proposal, after the initial review report, is placed before the Technical and other Committees of the Foundation. During the report period only 20 projects could be sanctioned at an estimated cost of Rs.3.725 million.

Discipline-wise list of grants sanctioned by the Foundation is given in table -1.

RESEARCH PROJECTS

Summaries of the research proposals sanctioned, during the year 1981-82, are given below:-

AGRICULTURAL SCIENCES

F-AU/AGR(74)*

Title: *Standardization of Methods for Determination of Available Copper and to Determine the Critical levels of Copper using Maize as test Crop*

Micronutrients are needed by plants in very small amount alongwith other micronutrients i.e. nitrogen, phosphorous, potassium, calcium, magnesium and sulpher. Micronutrients acts as activators in numerous enzymatic systems except chloride, whose role is to affect root growth. During rock weathering and soil formation, micronutrients are changed into their oxides, hydroxides, phosphates, sulphides and silicate etc. and are thus unavailable to the plants.

The project aims to study the response of copper in 15 soil series of Peshawar valley using maize as test crop.

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*For names of principal investigator and sponsoring institutions, refer to Annexure-II.

The finding of this study are likely to increase the yield of maize crop in the province by developing a package of technology for the proper and balanced use of copper alongwith major nutrients thereby avoiding the excess use of these nutrients which are not only harmful to the soil and plants but also involve unnecessary expenditure which the farmers spend on micronutrient application.

BIOLOGICAL SCIENCES

P-PU/BIO (102)

Title: *Studies on Verterbrate Fossils of Pakistan*

Vertebrate Palaeontology is an important branch of zoology which has remained neglected in this part of the world. Accordingly very little work has been done on Vertebrate Fossils by local scholars. Recent finding by some of the foreign teams have indicated the richness of fossil fauna particularly in Potwar region.

The proposed study envisages the collection of the fossils of Carnivora, Equids and Bovids animals from different parts of Pakistan. The specimens collected will be placed in the Pakistan Museum of Natural History being established at Islamabad under the aegis of Pakistan Science Foundation.

B-BU/BIO (107)

Title: *Study of Biology of Vertebrate Pests of Orchards of Baluchistan*

The vertebrate pests like rats, mice, rabbits, hare, porcupines and pigs etc. are known to cause great losses by damaging the cash crops fruit trees, forest vegetation, stored fruits and food grains etc. It is estimated that in developed countries like the USA, the vertebrate pests are responsible for damaging 20-30% of food grains and their production. Such losses have not been very well worked out for Pakistan. It is estimated that Ochotona rufescens caused an annual loss of Rs.70 million to the apple orchards of Baluchistan.

The project aims to identify and study the distribution of various pest in Baluchistan, their biology and the extent of damage caused by them. This base line data is needed to work out certain scientifically based control measures of these pests and hence minimizing their direct and indirect damages.

TABLE–I
SCIENTIFIC RESEARCH PROJECTS SANCTIONED DISCIPLINE WISE DURING JULY, 1973 to JUNE, 1982

	1973-79		1979-80		1980-81		1981-82		1973-82	
DISCIPLINE	No. of Scheme	Amount sanctioned	No. of Scheme	Amount sanctioned	No. of Scheme	Amount sanctioned	No. of Scheme	Amount sanctioned	No. of Scheme	Amount sanctioned
Agricultural Sciences	20	3.842	2	0.253	1	0.024	1	0.244	24	4.363
Biological Sciences	41	5.297	8	0.747	1	0.147	4	0.891	54	7.082
Chemical Sciences	47	6.379	10	0.727	7	0.631	6	0.681	70	8.418
Earth Sciences	11	1.158	1	0.054	–	–	–	–	12	1.212
Engineering Scineces	4	0.389	–	–	1	0.071	–	–	5	0.460
Environmental Sciences	10	1.180	3	0.274	–	–	1	0.100	14	1.554
Mathematical Sciences	3	0.214	–	..	1	0.020	1	0.016	5	0.250
Medical Sciences	18	1.086	2	0.101	9	1.096	10	1.794	39	4.077
Oceanography	2	0.182	1	0.283	–	–	–	–	3	0.465
Physical Sciences	15	2.919	2	0.136	–	–	1	0.096	18	3.151
Total:–	171	22.646	29	2.575	20	1.989	24	3.822	244	31.032

S-KU/BIO (109)

Title: *A Qualitative Survey of Nodulating Ability of Legumes of Pakistan*

Pakistan is basically an agricultural country. We need a lot of artificial manure for our soils in order to get good harvest. The cost of artificial manure has gone up tremendously in the past few years and it is becoming increasingly difficult for agriculturists to meet this cost. The deficiency of nitrogen in the soils, where agricultural crops are to be harvested, can be made up by first planting a crop of nodulated legumes in these fields - a practice known as crop rotation. The deficiency of nitrogen in the soils, where afforestation is to be practiced, can be made up by planting nodulated legumes in these fields. The legumes are one of the most numerous plant groups with the total number of species not precisely known. It comprises more than 12,000 and might reach upto 17,000 described species. The well established feature of these plants is the presence of nitrogen fixing root nodules.

The project envisages a systematic survey of Legumes of Pakistan and Cross inoculation/experiments between legumes of agricultural importance and screening of Thixobial strains that are most efficient in nitrogen fixation.

The proposed work pertains to the field of biological nitrogen fixation which has a great potential to increase productivity in forestry and agriculture and thus falls under areas of top priority research. The results of this research would be of basic and fundamental importance and would find their application in the field of agriculture and forestry.

B-BU/BIO (III)

Title: *Soil Vegetation and Termites - their Inter-relationship in Baluchistan*

Termites constitute an important component of soil fauna in arid to sub-humid tropics of the world. They play an important role at herbivore and decomposer level in mineral cycling and flow of energy in the eco-system. Pakistan with a termite fauna of about 50 recorded species has a serious termite problem. They cause a considerable damage to agricultural crops, forest trees, orchards, wood-works in buildings and furniture, cloth and paper. Climate, soil, and vegetation are important ecological factors involved in termite distribution. For an effective termite control it is very essential to have a full knowledge of termite popûlation dynamics in various habitats.

The project aims to study the population dynamics of various termite species in different vegetation and soil conditions.

The results of these studies are likely to contribute in saving the scanty plant wealth of Baluchistan area which is being destroyed by termites.

CHEMICAL SCIENCES

P-UET/CHEM (118)

Title: *Studies on the Food Potential of Indigenous Algae*

Nitrogen and Phosphorus compounds are among the major chemical components of domestic, industrial and agricultural waste effluents. These compounds are also the prinicpal nutrients for the Photosynthetic production of algae. The growth of algae under certain conditions brings nitrogen and phosphorus stripping of the effluent. The algal cell mass could be removed to serve as a protein rich animal feed and the treated effluent could safely be reused for any purpose or allowed to discharge in water ways or lakes without any risk of silting or eutrophication. The recycling of wastes through algal culture on waste effluents being a rich renewable source of energy food and chemicals and a process of established worth in advanced countries would bring immense benefits to this country too if necessary R&D studies are carried out.

The project aims at studying the nitrogen and phosphorus stripping efficiency of the various algal species at optimum conditions for the harvesting of the algal cell mass and chemical composit ion, nutritional evaluation of the algal biomass.

The results of this study would be helpful in practical utilization of algae and would contribute significantly towards the national effort to achieve self sufficiency in food apart from offering an economic solution to the massive waste treatment problem.

S-SU/CHEM (125)

Title: *Industrial Enzymology and their Characterisation*

Enzymes are protenious in nature synthesized in living cells and show controlled catalytic activity even when these are separated from the sources. Industrial enzymes are produced from plants, animals and micro-organisms.

The Industrial waste material of paddy field i.e. the rice husk can be utilized in the development of enzyme technology. There is a need to encourage the use, exploration of indigenous material and to search for alternate energy sources.

The production and the development of enzyme technology is the prime object of this project. To achieve this objective work on (i) the characterisation of the phospholipases and Cellulases among micro-organisms using waste material shall be undertaken and (ii) the purification and optimisation of the enzymatic activities of such preparation would be done.

The proposed study would not only underline the need to encourage the use and exploration of indigenous material but also meet the market demand for the enzymes required by different countries which depend on imported sources.

S-CSIR/CHEM (129)

Title: *Studies on Plants of Medicinal and Nutritive Value namely (1) Valeriana walichii (Valerinaceae) (2) Orchis latifoli (Orchidaceae) (3) Ervatamis coroaria (Apocynaceae) (4) Nigella sativa (Ranun Ulacea).*

Pakistan like many other countries is rich in medicinal flora. No serious and meaningful effort has been made on national scale to economically explore the medicinal flora abundantly available in the country. Maximum possible use of herbs in medicinal practice is both in the economic and political interest of the developing countries. The Unani system of medicine which has been vague in this country for centuries is fairly indicative of the possible curative properties of most herb . The authenticity of the medicinal properties claimed by 'Hakims' is only based on information given in old books or their personal experience.

The proposed study aims at detailed chemical investigation of Valeriana wallichi, Orchis latifolia, Ervatamia coronaria and Nigella sativa.

The study in this field means freedom or least dependence on imported synthetic products and maximum use of herbs in medicinal practice.

P-PU/CHEM (130)

Title: *Investigation of the Reactivity of Phosphate Esters*

Esters of ortho, pyro and trio-phosphoric acids occur in living organisms and play vital role in all life forms. They have an important role in primordial life. There is hardly anything going on in the living cell that does not involve phosphate esters in one form or another.

The study aims to prepare a series of diphenyl aryl phosphate esters and to study their hydrolysis at various pHs (catalysed & uncatalysed) and to establish a correlation between structure and reactivity. The project also aims to study the mechanism of these reactions, which shall give an insight to the mechanism of reactions taking place in the living systems.

This study shall help to understand chemistry of living organisims.

ENVIRONMENTAL SCIENCES

S-KU/ENVR (21)

Title: *Pollution due to Waste Water Affluent from Textile Mills in Karachi*

The environmental and pollution control studies have not so far been given due importance in our country. As a result there is not only a great wastage of recoverable water, but also pollution of environment, river and sea water with a consequent loss of BOD and COD value of water on which marine life and quite a substantial portion of our economy depends. It is recognised internationally now that industrial waste water should not be allowed to drain without proper treatment till harmful elements are either removed or made effectless. Also the waste water can be feasibly treated for recovery and this can be an extra benefit to the Industries using large quantities of water. It is also observed that salt rich waste water from textile Industries, make the fertile land saline and consequently barren. A little treatment before wastage may reduce such danger to a considerable extent.

The project aims to make a detailed study of the problems of pollution due to industrial liquid waste of textile mills in Karachi.

MATHEMATICAL SCIENCES

P-GC/MATH (12)

Title: *Higher Order Variational Problems in Group Variables.*

Problems in the calculus of variations whose large range function involving higher order derivatives have received considerable attention in the early 18th century. High order variation problems in the branches of physics and mathematics can be applied with varying degrees of success.

The aims of the project is (i) to promote research in applied Mathematics in the country which no doubt is badly needed in Pakistan. (ii) Generalising the known results pertaining to such problems by introducing the concept of group variables in them.

The research work will likely help to prove interesting theories of generalised mechanics and electrodynamics.

MEDICAL SCIENCES

P-AEMC/MED (58)

Title: *Neonatal Screening for Hypothyroidism and its Relationship to Mental Retardation*

Congenital hypthyroidism is probably the most common preventable cause of mental retardation. Its occurance exceeds that the Phenyl Ketoneria approximately 1 in 3000 to 1 in 7000 births, a range indicated by screening programmes. At present there is no scientific method available in Pakistan in order to detect neonatal congenital hypothyroidism. Clinically it is not possible to detect congenital hypothyroidism at the time of birth. Delay in the diagnosis of this abnormality cause irreversible brain damage resulting in mental retardation of the individual.

This project is aimed at devising a radioimmunoassay method for the estimation of neonatal T4 & TSH levels within 3 days of birth. This information describes the biochemical function of Thyroid Gland of the infant and treatment for congenital hypothyroidism can be started during the first month of birth.

The results of this study would made it possible to prevent mental retardation of the child which otherwise could have serious consequences on the personality of the individual. The socio-economic benefits to the parents and to the society by preventing mental retardation which produces handicapped children are obvious.

S-DMC/MED (66)

Title: *Identification of Biochemical Errors causing Brain Damage and Neurologic Disorders*

Defects in Metabolism of proteins sugars and lipids, mostly of inherited nature, have been discovered in the past decades. They

form an important component of neurological disorders specially in infants and children, and cause a wide variety of disorders including arrest of growth, failure to thrive, epilepsy, learning and language difficulties, behaviour disorder etc. Being genetically determined, their incidence might be higher in our population because of cousin marriages. However, these conditions have never been properly diagnosed and identified to any significant degree and their clinical and genetic pattern in our population has never been elucidated.

The present scheme envisages to (i) develop and evaluate methodology of specific biochemical tests for diagnosing neurological disturbances caused by biochemical abnormalities (ii) define clinical features of such disease and genetic patterns of such disorders as reflected in the cases to be studied.

The study will be the first effort of formal neurobiochemical undertaken, basis for work in the field of neuro sciences, which is on of the most rapidly advancing fields in the world, and is likely to yield meaningful data for understanding the neurological disorders.

C-LMC/MED (71)

Title: *Ultra-sound in Obstetrics and Gynaecology*

No study about gestational age, growth retardation of foetus has been conducted in our country and the relevent specialists are constrained to utilize the information of industrialised countries which can be different in many ways and cannot be applied to our population.

The project aims at studying the (i) estimation of a gestational age by B.P.D. (biparital diameter), (ii) estimation of growth and retardation of foetus and (iii) placental localisation. About 300 mothers will be studied with follow up each year for a period of 3 years.

The information thus collected will be made available to other gynaecologists so as they can establish base line and watch the progress of foetus in order to avoid any complication during pregnancy in the form of foetal growth retardation and placental localisation.

P-PMI/MED (72)

Title: *High Altitude Medical Research Project: Incidence of Malarial Parasites in the local population, with special reference to Mosquitoes and other Dipterous Fauna of Medical importance*

Malaria, which is endemic in Pakistan, was ignored to occur above an altitude of 5000 feet. However, its discovery in small isolated villages in Gilgit agency upto an altitude of 10,500 feet was not only suprising but also intriguing. Man at high altitude is exposed to an abnormal atmospheric pressure and physiologically speaking leading a stressful life.This condition is further aggravated by poor health and socio-economic conditions.

The scheme aims at studying (i) ecology of malaria and its vector at high altitude, (ii) problems faced by the local and visiting residents by direct or indirect effect of malaria and its vectors, and (iii) devising special strategy to control or eradicate malaria at high altitude using special methodologies.

The information gathered will not only help in control or eradication of malaria, in terms of substantial decrease in mortality or disability in different age groups, but also in economic terms.

F-MH/MED (73)

Title: *(i) High Altitude Mountain sickness: Explorative and evaluative study (ii) Rheumatic Fever Heart Disease comparative and Presentive Study*

Effect of high altitude on human cardiocirculatory dynamics and associated disorders such as acute mountain sickness and pulmonary odema have been the subject of intense research in the last decade. Pakistan is located in geographic belt of Rheumatic fever heart disease alongwith Nepal, India, Afghanistan, Egypt and other African countries. Failure in control of this ailment is linked with socio-economic development in these countries.

The project envisages to study the mechanisms of mountain sickness with its various manifestations with a view to find out whether specific measures employed are useful or not and have a scientific basis in relation to the response of the cardiovascular system at high altitudes. The prevalence of Rheumatic fever - Heart disease will also be studied to prevent it with its special circumstances of people living at high altitude.

PHYSICAL SCIENCES

P-PU/PHYS (36)

Title: *Some Aspects of Thermonuclear Fusion*

The plasma physics is a field of great importance because of its varied applications particularly the possibility of achieving controlled thermonuclear Fusion. Like other developing countries, different organisations of Pakistan are planning to make research in the said field. At present the subject is open and all the laboratories which are actively engaged in this area, accessible to Scientists of the developing world. This state may not last very long and the work may become classified. The research/technology of Fusion may become in accessible to a country like Pakistan.

The proposal aims to investigate some of the problems concerned with different aspects of Plasma Physics Fusion Research.

i) Kinetic theory

ii) Heat loses from a plasma in Fusion mechanics.

iii) Plasma heating shock waves, electron, cyclotran resonance.

The completion of this project shall strengthen the research activities in the said field and shall generate the necessary manpower.

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 institutions and it is established that such support would lead to quick progress of research of national significance. The emphasis is on (i) fostering and equipping multi-disciplinary research units directed towards the solution of areas of high research priority; (ii) provision of equipment, literature, staff training facilities and improvement of data processing, documentation and information systems and similar facilities which would build up research capability selected research centers and units.

During the current financial year a number of institutional support requests were received by the Foundation from various Universities and research organisations. Out of these 11 institutions were given grants totalling to Rs.0.702 million to enhance their research capabilities. The details of these grants are given at Annexure-III.

III. UTILIZATION OF RESEARCH RESULTS

Utilization of the results of scientific and technological research including pilot plant studies, to provide the technical and economic feasibility of processes found to be promising on laboratory scale.

The most pressing problem of Pakistan is to equalise technological levels with contemporary world. Except in the tiny modern sector, the prevailing technology is traditional and low in productivity. Effective utilization of the results of research from world as well as indigenous sources, technology transfer and its widespread application, is dependent upon the adequacy of institutions, mechanisms and programmes aimed at this specific purpose. The Pakistan Science Foundation, with its limited resources is endeavouring to provide financial assistance to the R&D institutions to utilize the results of research and develop appropriate technologies.

IV. SCIENCE CENTRES

The establishment of Science Centre, Clubs, Museums, Herbaria and Planetaria is one of the important functions assigned to the Pakistan Science Foundation under its charter. These Institutions/ Organisations are needed to create awarness among masses about the role of Science and Technology. The creation of such infrastructure however, involve a lot of financial investment. Therefore, the Foundation, as a first step has undertaken one major programme namely "Establishment of Pakistan Museum of Natural History" at Islamabad. Moreover, other science promotion activities such as organisation of Science Fairs/Exhibitions at various places in collaboration with local educational institutions is also under way.

The progress made during the report period for the achievement of this objective is as under :-

(a) Science Centre

The Foundation arranged a number of talks, lectures at PSF Science Centre by eminent scientists/experts for exchange of ideas. The lectures included topics such as:

- Role of Universities and R&D Institutions in the development of S&T.
- Science and Technology in Islamic World.
- Fundamentals of Solar Properties of Hydrogen.

- Food Production and Nutrition.

- Risk of life - Environment.

In addition to these lectures, documentary science films were regularly shown about wild life, environment and technological advancement in various fields of Science and Technology.

b) Science Fairs/Exhibitions

During the report period the Foundation sanctioned an amount of Rs.75,000/- to the University of Baluchistan, Quetta for organizing a Science Fair in the year 1982-83.

c) Establishment of Pakistan Museum of Natural History

The project for the Establishment of Pakistan Museum of Natural History was approved by the Government in 1978. The Ist Phase of the Scheme, initiated in May, 1979 is nearing completion. The Ist phase included setting of the Museum offices in a rented building, appointment of staff, their on the job training and collection of natural wealth of the country. The PC-1 for the 2nd phase of the project which includes construction of permanent Museum building, is under preparation and will be submitted shortly for Government approval.

The progress made by the Pakistan Museum of Natural History during the report period is as under:-

I. BOTANICAL SCIENCES DIVISION

a) Research Articles Published or Accepted for Publication

Abstract of a paper entitled "An altitudnal repatriation of Liliaceae in Potwar region." Pak. J. Bot. 14 (102): 45 (1982).

b) Research Articles Submitted for Publications

A manuscript "Altitudnal repatriation of Liliaceae in Potwar region" submitted to the all Pakistan Conference of Plant Sciences.

c) Reference Collection

Plant specimens collection	= 8396+570
Identified	= 4650
Displayed	= 5050

Described	= 156
Catalogued	= 800
Preserved	= 380
Labelled	= 30

d) *Collaboration with Other Organizations*

1. Three hundred plants indentified for students of Viqar-un-Nisa Girls College.

2. Fifty plants identified for Quaid-i-Azam University students.

e) *Conference/Meetings*

Curator, Botanical Sciences Division participated in All Pakistan Conference of Botany.

II. EARTH SCIENCES DIVISION

Research Articles Published or Accepted for Publication:

Accepted for publication a report on "Rodents fossil fauna of Bugti region" in a journal of International repute.

Research Assignments Completed

1. Seventeen slides of minerals and rocks were made and studied.

2. A new locality (in Jalapur area) for rodents has been discovered. New specimens of rodents are being extracted from the earth material collected from this locality.

Reference Collection

Replicas of human skull	= 3
Fossilized Rhinocerosis mandible	= 3
Fossilized Molar of Probosidian	= 1
Mineral specimen collected	= 60

III. ZOOLOGICAL SCIENCES DIVISION

1. A skeleton of 60 ft. long blue whale brought from Karachi coast was added to the Museum collection. Moreover 9 different species of marine invertebrate animals were also brought from Karachi.

2. 1279 specimens of Invertebrate and freshwater vertebrate were collected.

3. 900 specimens identified and catalogued.

4. 1162 insects specimens were collected out of which 300 specimens were identified and catalogued.

5. One Chimpanzee, one Hog Deer, 3 fruitbats, Grey partridge pea fowl, 175 other vertebrates belonging to different groups were also collected identified and catalogued.

6. 73 marine animals were added to the collection identified and catalogued.

Training programmes for other Agencies

Trained a Taxidermist of Northern Areas of Forest Department.

Conference/Meetings

1. The Director P.M.N.H. participated in Punjab/Wildlife Management Board meeting Chaired by the Governor of Punjab and participated by 24 members including the Provincial Agriculture Minister. Scientific management of Punjab Wildlife was main theme of there decisions.

2. The Director P.M.N.H. participated World Wildlife Fund presentation held in Lahore on 28th Feb. 1982 in honour of the Duke Edinburgh who is President of W.W.F. Mr. Z. B. Mirza was awarded W.W.F. International Award for Conservation Merit.

3. Director P.M.N.H. participated in Ayub Park Development meeting in which environment education in the Park was discussed.

4. Director P.M.N.H. participated in Lal Suhanra National Park aims and objectives meeting. In this P.M.N.H. participation in writing of interesting fauna of the Park was decided.

IV. ART SECTION

Exhibits specimens of the vertebrate and invertebrate animals prepared. Chimpanzee skeleton was cleaned and bleached its articulation in progress. Hog Deer, Gazella, Grey partridge, Chakor, Dhaman snake stuffed and displayed. Ten showcases of insects fully decorated and calligraphy completed. A number of exhibits were also prepared which include display of small animal in the perspex jars and display boards. Forty jars of perspex made in

Zoology Lab. and specimens mounted. Furthermore adoption of food and habits of animals of economic importance; "World of Insects" and "Dance and Director of Bees", also arranged. Two amphibians made transparent with bones visible through body. Five and half feet long replica of snake painted, 28 1/2" replica of another snake completed. cataloguing for three Zoological exhibits completed. 4 different kinds of snakes prepared, One Urial stuffed.

An exhibit with three water ponds marshy vegetation, decorated with fish, aquatic birds, near-aquatic birds, shells and aquatic insects completed.

An exhibit with alpine zone, artificial snow, snow Leopard, palm civits in the blue pine zone, Sea partridge, flying squirrels, Monkeys, other mountain birds and pagolin prepared. Total number of jars prepared out of perspex sheet. Twenty four specimen displayed in the jars. The tanning of skins of Hog Deer and Chimpanzee completed. Skeleton articulation of Chimpanzee under process.

2.12"x5" painting of Zoological nature in showcase prepared.

A display of calligraphy in plant seeds prepared. A large map of Pakistan including timber distribution in progress. Display of pulses of Pakistan in preparation. Painted ten trees a plant in water with Botantial details, made a chart using seeds prepared a chart of altitudinal repatriation of Liliaceae in Potwar region. 100 plants freeze-dried and mounted.

11 plant exhibits were prepared.

Two showcases have been completed displaying the distribution of Timber in Pakistan and edible oil seeds. In addition to these the identified plants were displayed in 20 wall hangings.

Moreover a number of aquatic plants preserved in 15 small jars for display purpose.

30 pressed plants displayed in glass frames with their names and significant values.

Edible oil display projected through a wall exhibit.

Water colour paintings of 4 plants completed.

Calligraphy for two more botanical exhibits completed.

1.4"x3" painting of botanical nature on canvas prepared.

One exhibit of gems prepared.

Classification of mineral chart completed.

Two wall exhibits showing global changes prepared.

A large wall display showing global changes completed.

One exhibit showing Gem-stones in Pakistan completed.

Calligraphy of two exhibits of Earth Science completed.

Free style lettering in design form for two exhibits completed.

Two exhibits of precious stone prepared.

Lettering Miscellaneous paintings prepared.

V. *SCIENTIFIC SOCIETIES/LEARNED BODIES*

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

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.0.570 million were released during the year to various non-governmental scientific societies and learned bodies for the achievement of their approved objectives (Annexure-III).

Special grants totalling Rs.0.260 million were sanctioned to various scientific societies/institutions for their publication programmes (Annexure-IV).

VI. *SCIENCE CONFERENCES*

Organization of Periodical Science Conferences, Symposia, Seminar etc.

During the report period, grants totalling Rs.0.140 million was given to various organizations, R&D institutions and scientific societies for holding seminar, symposia and conferences. A brief account of some of the seminars/symposia is given below:-

a) Seminar on "The Role of Scientists and Engineers in the improvement of Productivity", was organised by the Institution of Engineers, Pakistan on 9th May, 1981. About 100 eminent engineers/ scientists and members of the Rawalpindi Centre attended this seminar. Three technical papers were read by eminent engineers.

b) Summer School in Science for Talented students of Intermediate Classes was organised by the Board of Intermediate and Secondary Education Lahore in collaboration with the University Grants Commission and the Foundation from 9th-25th August, 1981. In all

40 talented students and five teachers were selected from seven institutions. The aim of organising this summer school was to orient and train talented students in research in pure and applied sciences and also to spot the talent.

c) The International seminar on "Rehabilitation of the mentally ill," was organised by the Lahore Mental Health Association in collaboration with the Fountain House, New York from 12th to 16th November, 1981. The Association is active in helping the mentally ill and aims to promote education for mental health, to foster research into the causes, cures and prevention of mental disorders. The seminar was attended by a number of doctors etc. who expressed their views on the topic.

d) The 2nd All Pakistan Zoological Congress was held at the Sind Agricultural University, Tandojam from 26th - 27th December, 1981. The aim of this congress was to : (i) review the research activities in Pakistan (ii) identify research problems of national importance (iii) Co-ordinate research in various fields of Zoology and (iv) discuss and suggest the course of syllabus for teaching Zoology. About 150 Zoologists participated and presented papers.

e) Pakistan Botanical Society, organised a meeting of Plant Scientists on all Pakistan basis in view of the importance of cross fertilization of ideas of scientists working in different parts of the country on similar problems which can hardly be emphasized and to promote collaborative research on topics of great interest in Pakistan.

f) The 28th All Pakistan Science Conference was held at the Bahauddin Zakirya University, Multan from 4th-8th April, 1982 under the auspices of the Pakistan Association for the Advancement of Sciences to promote and develop science awareness in our country. About 350 participants attended the conference and presented their papers.

VII. EXCHANGE OF VISITS

Exchange of visit of Scientists and Technologists with other countries.

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

Grants totalling Rs.0.260 million were sanctioned to eighteen scientists, (Annexure-VII) to attend International Conference/Symposia and to meet their counterpart in institutions of higher bearing in advanced countries.

VIII. AWARDS AND FELLOWSHIPS

Grants of awards, prizes and fellowships to individuals engaged in developing processes, products and inventions of consequence to the economy of the country;

The Foundation did not receive any proposal of Scientific merit for the award of prizes, medals. Accordingly no award was sanctioned under this programme.

A grant of Rs. 5000/- was provided to the Nuclear Institute of Agriculture and Biology on account of fellowships to some of the participants of the 8th Post-Graduate training course.

IX SURVEYS AND STATISTICS

Under this programme a project entitled "Impact of non-dietry factors on the Nutritional Status of People of Pakistan was sanctioned by the Foundation to Dr. Siraj-ul-Haq Mahmood, Senior Chief (Health), Planning Commission, Islamabad for a period of eighteen months (1 1/2 year) at a total cost of Rs.67,400/-.

Malnutrition is caused by a variety of food supply and demand related factors as well as factors determining nutrient utilization in the human body. Average national figures from food balance sheets for Pakistan show little or no nutritional deficiencies. However when such figures are disaggregated by consumer income group, severe deficiencies are frequently observed. Hence in Pakistan the problem of nutritional deficiencies seems to be one of un-equal distribution of available nutrients rather than absolute scarcity.

The project aims to estimate the food availability and preparation of food balance sheets since independence by using data of

total food production import and distribution losses and to examine the implications of these estimates for public policy in the areas of income distribution, human nutrition, agricultural research and other supply related issues.

X RESEARCH EVALUATION

The Foundation evaluated the following technical/fiscal reports received during the report year as per procedure laid down, in its fifth annual report, for reviewing the progress of scientific research supported by the Foundation and evaluating the results of such research.

i) *Semi-Annual Reports*

Twenty nine six monthly reports, invited after the initiation of each project and after the submission of the annual reports, were scrutinised by the Science Wing of PSF to assess the interim progress of these projects.

ii) *First and Second Annual Reports*

As many as twenty two First Annual and eight Second Annual reports submitted by the Prinicpal Investigators, after initial scrutiny by the Science Wing, were sent for detailed evaluation to active scientific workers in the relevant fields of study. These progress reports were then submitted to the respective Technical Committee for consideration alongwith the evaluation reports of the experts concerned, which were ultimately accepted by the Technical Committee.

iii) *Final Reports*

Sixteen final reports in respect of the completed projects, received during the year report, were also submitted to the subject expert for review and evaluation and on receipt back from them, were submitted to the relevant Technical Committee for acceptance.

These reports, duly accepted by the Technical Committees, were placed before the Board of Trustees of the Foundation. The Board appreciated the research work done in these projects.

XI PSF SCIENTIST POOL

Biodata of as many as twenty five Pakistani Scientists living abroad and interested in returning to Pakistan were circulated amongst various Universities and Research Institutions in order to assist them in finding jobs suited to their qualification. Replies

from most of the Universities were received wherein they had expressed their inability to provide jobs to these scientists.

XII INTERNATIONAL LIAISON

The Foundation, during the report period, remained in contact with international, regional and national agencies like United Nations Educational, Scientific and Cultural Organization (UNESCO), Man and Biospher (MAB), United National Envirnment Programme (UNEP), Economic and Social Commission for Asia and the Pacific (ESCAP), National Technical Information Centre (NTIS) and US-National Science Foundation and their representatives visited Pakistan Science Foundation to discuss mutual collaboration in the field of Research, Conferences and Seminars.

The Memorandum of Understanding between the Royal Society of London, U.K. and the Pakistan Science Foundation was signed in September, 1981. The agreement envisages the exchange of visits of research scientists of post doctoral or equivalent status in pure and applied fields in two categories i.e. (i) Study visits; (ii) Fellowships. (Annexure-VIII).

During the report period two scientists namely Dr. P.J.Dale and Dr.J.W. Snape were nominated by the Royal Society of London for participation in the International Symposium on New Genetical Approaches to crop improvement "held at Karachi. The Foundation under the memorandum paid the local expenses of both the Scientists.

The Pakistan Science Foundation supported to the extent of return air fare, the visit of Dr. Khairat Ibne-Rasa, Vice Chancellor University of Punjab, Lahore to U.K. under the Memorandum. An amount of Rs.10,800/- was released to him for the purpose.

CHAPTER-2

PROGRESS OF THE PSF SUPPORTED PROJECTS

An account of the progress of PSF supported projects, received during the year 1981-82 is given below:-

A) FINAL REPORTS

During the year under review sixteen final reports were received. Particulars of these projects and brief summaries of the achievements made are given below:-

Project No.:	P-AU/Agr (5)
Project Title:	Effect of tractor powered tillage practices on crop yield and soil characteristics.
Name of Investigator:	Dr.Ghulam Sarwar Sheikh
Project Particulars:	
-Duration:	Three years
-Date of commencement:	1.11.1976
-Date of completion:	31.10.1979
-Total expenditure:	Rs.37,948/42
-Implementing Agency:	University of Agriculture, Faisalabad.
Main objectives:	To determine the types and combination of different implements for increasing crop yield.
	- To measure the soil properties for suitable tilth and the economic of different tillage operations.
	- To determine the sequence of operations which would create the soil environment for maximizing yields.

Summary of the Work Done:

A weed is unwanted and harmful plant which in a given situation is more deterimental to Agriculture than other pests as these plants compete with crop plants for moisture, nutrients, light, air and space, deprive them of their proper share of growth needs.

Pakistan although an agricultural country has to work hard for self reliance in food grains. Therefore our every effort should be devoted to the increased production. The reason for low yields may be attributed to many factors but the most important is the competition of weeds with the crop, by which 10-50% losses in crop yields are annually encountered. A developing country like ours cannot afford such losses.

Two major crops namely wheat and cotton were selected with the objective of identifying weed problems and their control.

The effects of different tillage implements on soil characteristics and crop yields were studied with a view to adopt minimum tillage practice so as to avoid extra expenditure on fuel and to enhance economic returns. In the present investigations, narrow tine cultivator and traditional practice of ploughing several times could not prove their worth in the light of the soil and crop parameters considered. It was inferred that excessive ploughing be avoided and the use of narrow tine cultivator be restricted. Sweep cultivator was, instead, considered a better substitute of the narrow tine cultivators. Operations with rotavator had favourable effects on soil characteristics, but it failed to maintain its standing from the stand point of economic return. Its use in seedbed preparation may, therefore, be recommended with reservations. Disc harrow performed best with respect to soil tilth, crop yields, and cost of production. However, its higher initial cost and manufacturing complexity are the major constraints discouraging its large scale production and use. Further, heavy primary tillage implements like moldboard and disk plows had favourable effects on soil characteristics when followed by disk harrow and sweep cultivator, but their use can be avoided, due to their high costs of operation.

Publication as a result of these Investigations

1978 Comparative Performance of Tillage Implements: Journal of Agricultural Mechanization in Asia, Japan. Autumn 1978.

1980 Disk Harrow - An Appropriate Tillage Implement; Journal of Agricultural Mechanization in Asia, Japan. Autumn 1980.

1981 Development and Comparative Performance of a Cultivator with Sweep Shovels; Journal of Agricultural Mechanization in Asia (A.M.A.), Tokyo, Japan, Spring Issue.

1982 Technical and Economic Feasibility of Tillage Implements under Irrigated Conditions; Paper Presented at the Second Annual Convention of Pakistan Society of Agricultural Engineering held at Lahore Pakistan on April 9-10.

Project No:	S-SU/Agr (13)
Project Title:	Exploration of nitrogen fixing algae from agricultural field of Sind.
Name of Investigator:	Dr. Shahnawaz Arbani
Project Particulars:	
-Duration	Three years
-Date of commencement	Ist March, 1975
-Date of completion	28th February, 1978
-Location of Scheme	University of Sind, Jamshoro.
-Total expenditure	Rs.2,34,421/-
Main objective:	To collect, identify and culture the nitrogen fixing species of Cyanophyceae from cultivated fields of Sind. The various species will then be investigated to determine their nitrogen fixing properties.

Summary of the Work Done:

Algal species belonging to cyanophycae or blue green algae are very important and serve as an excellent source of utilizing solar energy efficiently for production of organic matter in the soils. They are abundant in soils of tropical and sub-tropical countries especially in the regions devoted to the cultivation of rice. Realizing the ecological and agricultural importance of the blue Green Algae, exploration of nitrogen fixing species has been carried out almost

in all the rice growing countries of the world, Pakistan being one of the rice growing country, this project of collection, isolation and identification of algae species was started in order to know the algal flora, responsible for nitrogen fixation in our rice fields.

Soil sample containing algal species were collected from various agricultural cultivated land i.e. Mirpurkhas, Tando Allahyar, Tandojam, Tando Muhammad Khan, Badin, Sijawal, Thatta, Hyderabad, Hala, Sakrand, Nawabshah,Tharushah, Khairpur Mir's, Sukkur Shikarpur, Larkana, Dokri and Dadu, and other places belonging to Sind Province.

Several samples were also collected from other sources namely standing water in rice fields and neighbouring ponds located near agriculture fields. The soil samples were preserved in polythene bags and stored at room temperature. The isolation and purification of the blue green algae especially nitrogen fixing species were carried out by using Watanabe medium; Wieringa Medium; Knops media and nitrogen free media.

The collection of algal species was carried out from the rice fields of Thatta, Larkana districts. Soil sample were also collected from almost all the districts of Hyderabad and Sukkur Division. About 719 collections were made. By cultivation into artificial culture media about 52 species were Cyanophcae were identified out of which 23 were found to be heterocystons nitrogen fixing species belonging to genera Anabaena, Nostoc, Rivularia, Calothrix,Gleotrichia, Cyhlindrospermum, Aulosira, Scytonema and Tolypothrix of families Nostocaceae Scytonemataceae and Rivulraceae.

Project No:	S-AU/Agr (19)
Project Title:	Major crop weeds and their control
Name of Investigator:	Mr.Ghulam Nabi Kalwar
Project Particulars:	
-Duration	2 years
-Date of commencement	1-7-1976
-Date of completion	31-10-1978
Implementing Agency	Sind Agriculture University, Tandojam
-Total expenditure	Rs.1,24,337/-

Main objectives:

i) Survey of annual, bi-annual and perrenial weed occurance in major crops of Sind;

ii) estimation of losses due to weeds;

iii) development of control methods and

iv) determination of suitable weedicides.

Summary of the Work Done:

Wheat Crop

Weeds in wheat crop from three districts of Sind (Dadu, Sukkur and Hyderabad)were identified and intensity ofweed infestation was determined during the winter season. In all 230 samples were taken from irrigated and unirrigated (Bosi), Broad-cast and row planted wheat crop. It was observed that average weed infestation in wheat crop in Sind was 461 weeds/sq:m. As high as 661 weeds/sq: were recorded in Broad-casted (irrigated) Wheat. Row planted (irrigated) crop had low infestation of 362 weeds/sq:m. Thirty weed species were found to infest wheat crop out of which 17 weeds were commonly found at all locations.

Study of weed competition upto various stages of wheat crop was undertaken. It was observed that weed competition in wheat crop for more than 30 days after sowing became harmful for growth and grain yields of wheat crop. Approximate time of weeding in wheat crop was therefore found to be tillering stage between 30 & 45 days after sowing. Weeding at this critical stage was found to be the most beneficial.

The weedicides namely B anvel-M and Bromoxynil used in this study were found to be safe for the crop, equally effective as hand weeding and provided highly significant increase in grain yield over control and therefore are recommended for weed control in wheat crop.

Cotton Crop

Search for number and kinds of weeds infesting cotton in central and eastern zones of Sind (Districts Dadu, Hyderabad, Sanghar and Tharparkar) revealed that 40 weed species infested Cotton Crop. Grasses (14-species) were found to be major weed

problem followed by broad leaves and sedges.

Effects of weed competition in cotton crop were studied for two consecutive years and it was found that the corresponding crop stages upto which weeds completed with the crop were seedling stage (4 to 6 leaf) establishment stage (10" - 12" height squaring stage, flowering stage, Boll formation stage and the crop maturity stage respectively. It was observed that some weeds such as Cyperus rotundus, Cynadon dactylon, Convorunlus arvensis and Elesine aegyptiaca emerged within a week of sowing of cotton and completed with the crop since its early growth. Competition of weeds was minimum for nutrients and light upto 25 days of sowing time. The presence of weeds upto 25 days shared the crop mostly for moisture and space. However, the adverse effects were recovered. When crop was kept weed free from this time to crop maturity, the crop growth and finally seed cotton yield was not affected.

Competition become serious when weeds were allowed to grow with cotton for more than 45 days after sowing. The crop appeared retarded in growth pale yellow in color, some of the lower leaves became purple in colour or with scorched margins. Shedding of buds, flowers and bolls increased and finally seed cotton yield was reduced from 25 to 42%.

Removal of weeds from cotton crop at any stage of growth upto 85 days after sowing and found to be profitable. The result of this study indicated that the critical stage of weed competition was between 25 to 65 days after sowing.

Excellent weed control in cotton crop was obtained with the treatment of hand weeding by which 90% of weeds were eliminated and thus highest seed cotton yield of 2.10 tons/ha (22.50 maunds/acre was obtained. As compared to this untreated weedy crop yielded only 1.30 tons of seed cotton/ha. Increase in yield due to hand weeding was 60%.

The herbicide treatment also provided satisfactory weed control to the extent of 76-86% and increased seed cotton yield by 25 to 50% as compared to weedy crops. The increase in yield was mainly due to increased number of full size productive bolls/ plants.

On the basis of results of this study it could be said that in place of hand weeding which is laborious and costly operation, careful use of these herbicides may be profitable and easy method of weed control by which yield could be increased.

Project No:	SU/Bio (31)
Project Title:	Studies on the Taxonomy,Incidence Fluctuation and Ecology of the Parasites of Fresh Water fishes of Mancher lake.
Name of Investigator:	Dr. Ahmad Mohiuddin
Project Particulars:	
-Duration	Three years
-Date of commencement	January, 1975
-Date of completion	April 1977
-Implementing Agency	University of Sind
-Total expenditure	Rs.48,176/-
Main objective:	To study the Taxonomy, Seasonal fluctuation and Ecology of Parasites of Fresh Water Fishes of Manchar Lake.

Summary of the Work Done:

The carnivorous fishes (viz. Wallago, attu, Rita rita) are more favourite hosts than vegetarian fishes, (viz. Labeo rohita, Channa striatusa etc.). One possible reason of this high rate of infection in Wallago and Rita may be that fishermen are in the habit of throwing off all the visceral parts e.g. alimentary canal, liver, kidney, heart etc. in the lake as soon as they catch a fish. The probable reason is that since the dam is nearly 5 miles from the main lake, if they do not apply this practice the fish will be destroyed. Now these organs, some of them infected, are eaten, by carnivorous fishes and in this way they get the infection and continue the cycle.

Gills were found infested with copepods of E. peregrinus and S. undulatus. The infestation was observed to have a peak during January, February, April and June. Nematode infection was on the peak during January, February, March, May, November and December. During the month of March and May, 90% of Rita rita species were found infected with Neocucullanelus apharei. Nearly every part of the host was infected and penetrated.

No mortality in fish was observed due to the parasitic infection. Fishermen are in a habit of fishing even during the breeding season, which results in the continuous fall of fish population.

Project No:	C-QU/Bio (88)
Project Title:	Studies on the male reproductive Physiology of Primates with special reference to fertility regulation.
Name of Investigator:	Dr. M. Arslan
Project Particulars:	
-Duration	Six months
-Date of commencement	1-8-1979
-Date of completion	31-1-1980
-Implementing Agency:	Quaid-i-Azam University, Islamabad.
-Total expenditure	Rs.26,702/-
Main objectives:	To investigate the mechanism of various factors involved in reproductive physiology of Rhesus monkey (Macaca mulatta).

Summary of the Work Done:

The existing knowledge regarding the specificity of FSH and LH in regulating spermatogenesis and testicular steroidogenesis in this animal is inadequate. Studies carried out mainly in laboratory rodent have shown that function of interstitial cell is regulated by LH and that of Sertoli cell by FSH. Available evidence indicates that both androgen and oestrogen production may be related to the activity of interstitial cells whereas sertoli cell has been suggested as the main site of aromatization at least in the immature rat. The extended testicular quiescence and relatively low circulating levels of gonado-tropins during the juvenile and early prepubertal phase in rheseus monkey provide a convenient model for studying the effect of different gonado-tropins. In the present study data has been reported on testicular histology and testosterone and oestradiol concentrations in the testis and plasma of immature monkey treated with oFSH, OLH, HCG and PMSG. An attempt has also been made to correlate morphological changes in the testis with testosterone and oestradiol levels.

The results of this study have indicated that the monkey testis responds differentially to diverse mammalian gonado-tropins.

Project No:	S-KU/Chem (10/1)
Project Title:	Structural and synthetic studies in some B-Carboline basis.
Name of Investigator:	Dr.Salimuzzaman Siddiqui
Project Particulars:	
-Duration	3 years
-Date of commencement	lst May, 1979
-Date of completion	30th April, 1982
-Implementing Agency:	University of Karachi.
-Total expenditure:	Rs.2,39,042/-
Main objectives:	To prepare nitro and other derivatives of B-carboline in order to obtain new Pharmacologically important substances, which could find use in medicine. To obtain new B-Carboline derivatives from Peganum harmala seeds harmaline and harmine. Investigation on commercially feasible procedure for the extraction of oil from kermels of peganum harmala seeds would also be continued with a view to developing a process for ultimate large scale isolation of edible oil.

Summary of the Work Done:

In the context of studies in correlation of structure and activity of B-carboline bases a large number of new derivatives have been synthesized and characterized through physical and spectral data. The work carried out in the direction referred to above has been mainly concerned with:-

1. Structure and activity relationship study in Peganum harmala alkaloids harmine, harmidine and tetrahydroharmine.

2. Comparative study of cyano derivatives of B-carbolines, steroidal and some simpler bases.

3. Structure and activity correlationship study in the sandwicine series of Rauwolfia alkaloid.

4. Conversion of harmala alkaloids into other types of alkaloidal bases of potential therapeutic importance.

5. Nitration studies in yohimbine.

As a result of extensive researches carried out with Peganum harmala alkaloids harmine, harmidine/harmaline, their common reduction product tetra-hydroharmine and their demethylated products harmol and harmidol, a number of new derivatives have been obtained in high yields as noted in "Results of Discussions". It was noted during the course of these studies that von braun BrCN reaction undertaken with harmidine gave bromo products instead of the expected yano derivative, whereas nitration of some tetrahydroharmine derivatives involved substitution at C-2 indole with ring opening.

Extension of von Braun BrCN reaction on tetrahydroharmine, aminotetrahydroharmine, sandwicine and isosandwicine has resulted in the synthesis of a number of new derivatives of potential therapeutic importance. Comparative study of cyano derivatives of B-carbolines, steroidal and some simpler bases has also been made, with a view to determine the scope and limitations of the applicability of these reactions.

Attempts have also been made to convert harmala alkaloids into other types of useful alkaloidal bases. Partial synthesis of 1-methoxyrutacecarpine and 11-methoxynauclefine have been achieved through harmidine/harmaline. Nauclefine which is a minor indole alkaloid having B-carboline moiety in its structure has anti-leukaemic properties.

In view of increasing pharmacological properties of the nitro derivatives of Rauwolfia alkaloids, it was considered of interest to extend these studies to yohimbine, a yohembehe alkaloid, also found in many Rauwolfia species. As a result of time consuming studies, two isomeric mononitro yohimbine and their various new derivatives have been obtained, as described in detail in the following pages. The structures of all these derivatives have been assigned through spectral and chemical studies.

Pharmacological studies in various derivatives are being pursued with particular reference to their psychotomimetic and

anti-leukemic action, one of these derivatives, namely sulforamide of tetrahydroharmine has been found to have analgesic property without any undesirable side effects.

Project No:	P-PU/Chem (27/1)
Project Title:	Production and characterization of Enzymes of commercial importance.
Name of Investigator:	Dr. M.I.D. Chughtai
Project Particulars:	
-Duration	3 years and one year extension
-Date of commencement	1-2-1977
-Date of completion	13-1-1981
-Implementing Agency:	Punjab University, Lahore
-Total expenditure:	Rs.3,53,318/-
Main objectives:	The project aims at isolating and purifying enzymes lipases and proteases from indigenous animal and plants sources for their possible uses. The investigation would result in finding new sources of enzymes of commercial importance.

Summary of the Work Done:

The objective of this project has to enhance the production of lipolytic and proteolytic enzymes in fungi by induction and also to study the pattern of lipid synthesis under these conditions. As a result of these studies it was possible to relate this pattern of lipid synthesis with that of induction of lipolytic enzymes.

The work of production of lipase showed that out of the three Rhizopus species, R.arrhizus was most potent and amongst the six Mucor species studied, M.hiemalis was the best producer of lipase. Growing all these organisms in the presence of triglycerides showed lipase induction to varying degrees. Triglycerides of oleic acid were found to be best inducer of the enzyme in general.

Oleic acid was also found to inhibit the enzyme to a greater extent as compared to saturated fatty acids and erucic acid. Lipase induction took place in the mycellia of all the fungal species, thus resulting in greater enzyme activity in both the mycellia and the broth. In the case of R. oryzae however the broth activity decreased in the presence of triglycerides. This was due to the inhibitory effect of fatty acid dominating the enzyme induction. Irrespective of the carbon source used in the growth media both the mycelia and the broth lipase showed maximum activity against the triglycerides of coconut oil.

Detailed investigation on M. hiemais elucidated some mechanisms involved in the lipase induction. Thus addition of triglycerides in the beginning of fermentation showed maximum induction. The lipase induced by a particular type of triglyceride did not specifically hydrolyse the same triglyceride nor was it inhibited specifically. The triglycerides were utilized through the formation of fatty acids.

There were interesting changes in the pattern of lipid synthesis by the fungal mycelia when grown in the presence of olive oil triglycerides instead of glucose as the carbon source. By growing M.hiemalis in the presence of triglycerides not only there was an overall increase in the synthesis of lipids but also there was a significant change in the composition of these lipids at the various stages of growth. In the medium containing glucose as the carbon source there was an abundance of polar lipids in the early stages of growth whereas quantity of neutral lipids increased at the later stages. In the presence of triglycerides, however, the pattern of lipid composition remained nearly constant through the growth phase. Thus the lipase induction was also associated with greater turn over of the neutral lipids specially triglyceride. The absolute amount of the polar fractions of phosphoglycerides also showed increase in the mycelial lipids of triglyceride media.

Six Mucor species were screened for the production of proteolytic activity. Out of all these M. hiemalis was found to produce maximum amount of the enzyme in both the mycelia and the broth. Useful results have also been reported on the effect of various carbon and nitrogen sources on the production of protease by the various Mucor species.

These studies have thus, apart from helping in understanding some of the mechanisms involved in the induction of enzymes and lipid synthesis in the eukaryotic organisms, would also be of great significance in enhancing the actual yields of the enzymes and also production of some of the rarer lipids species of phosphoglycerides. The enzyme involved being of considerable commercial importance these studies can therefore be of much economic value.

Publication as a result of these Investigations

Qayum, A. Mirza, Akhtar, M.W. and Chughtai, M.I.D.	1982	Production of Lipids and Lipase Activity during growth of Mucor heimalis. Can. J. Microbiol. 28: 618-622.
Akhtar, M. Waheed: Mirza, M.Q and Chughtai, M.I.D.	1980	Studies on Lipase Induction in Mucor hiemalis. Appl. Environ. Microbiol. 40, 257-263.
Akhtar, M.W.:Nawazish, M. Nadeem Pasha, M.; and Mirza, A.Q.	1980	A comparative study of Mucor Lipase and Phospholipase Activities using organic solvent systems. Pak. J. Biochem 13: 56-62.
Mirza, A.Qayum: Akhtar M. Waheed & Chughtai, M.I.D.	1979	Effect of different triglycerides on Lipase production by various Mucor species. Pak. J. Biochem 12, 10.17.
Akhtar, M.W., Mirza, A.Q. and Chughtai, M.I.D.	1977	Influence of the Nature of Triglycerides on Lipase Production by Rhizopus species, Pak.J. Biochem 10: 82-87.
Akhtar, M.W.: Mirza, A.Q. and Chughtai, M.I.D.	-	Influence of Triglycerides on Lipase and Lipid production by Mucor hiemalis. Submitted for publication to Can. J. Microbiol.
Khan, Rehana S.; Akhtar, M.W. and Chughtai, M.I.D.	1979	Effect of Nitrogen Source on the Growth and Protease production by Mucor species, Pak. J. Biochem. 12: 68-74.
Khan, S. Rehana, Chughtai, M.I.D. and Akhtar, M.W.	1979	Effect of Carbon Sources on Protease Production by Mucor species Pak. J. Biochem. 12: 36-42.

Degree Awarded

2 Students were awarded Ph.D. degrees under this research.

Project No:	P-CSIR/Chem (66)
Project Title:	Development of steroid chemistry in Pakistan because of its pharmaceutical as well as socio-economic impact.
Name of Investigator:	Dr. Karimullah
Project Particulars:	
-Duration	3 years
-Date of commencement	1-9-1977
-Date of completion	31-8-1980
-Implementing Agency:	PCSIR Laboratories, Lahore.
-Total expenditure:	Rs.2,49,020/-
Main objectives:	The project aims at undertaking the:-

i) Chemical transformation and synthesis of important steroid intermediates from readily available steroid precursors in Pakistan e.g. Diosgenin, bile acids etc.

ii) Chemical transformation and synthesis of contraceptive steroids, currently used in controlling fertility, from important key steroid intermediates.

iii) Synthesis of adrenocortical and anabolic sterioids and sex hormones from the key steriod intermediates.

Summary of the Work Done:

Pakistan is importing a large number of expensive steroidal

life-saving drugs and steroidal hormones at an estimated cost of Rs.50 million per annum. These drugs and hormones such as cortisone, hydrocortisone, dexamethasons, prehnisolone. progresterone, testosterone methyl testosterone and contraceptive steroid are mainly produced from diosgenin, hecogenin and tigogenin which are naturally occuring steroidal sapogenins of vegetable origin. The promising plant source in Pakistan are Dioscorea deltoides, Trigonella foenumgraecum (Fenugreek) and Agave, which yield diosgenin, yamogenin, hecogenia and tigogenin etc. Discorea deltoides grows wild in the Northern Region of Pakistan, while Fenugreek is cultivated in the plains.

The present work describes the physico-chemical studies on the roots of Discorea deltoides and Fenugreek for diosgenin content and the production of diosgenin on a pilot plant scale. The work also describes chemical conversion of Diosgenin to 16-dehydro-pregnenolone Acetate (16-DPA) and dehydro epiandrosterone which are important key steroidal intermediates. These key-intermediates were also converted to progresterone and 17-methyl-androst-5-en-3B, 17N-diol.

Preliminary laboratory studies showed that the old roots of Discorea deltoides from Kaghan and Indus Vallies contined about 4 to 8 percent of diosgenin on a dry basis. Optimum conditions were standarized for the recovery of diosgenin from the tubers on laboratory and polit plant scales.

Three pilot plant units such as slicing machine, hydrolysis vessel and solid-liquid solvent extractor were designed and fabricated for the extraction of diosgenin from the root (Figures 1,2 & 3).

Physico-chemical studies of local Fenugreek (Metha-seeds) showed that the seeds contain 0.37 percent of semi-drying oil and the residue meal containing 26 percent protein.

The technical know-how has been developed for the production of Diosgenin from the roots of Deltoides and conversion of diosgenin to 16-dehydropregnenolone acetate. The local production of these steroids will not only earn foreign exchange but also form a basis for more detailed studies for the production of steroidal drugs and intermediates.

During the research and development work on the production of disogenin and steroidal intermediates, we have given technical assistance to Kurram Chemicals, Rawalpindi, by providing design of slicing machine, recommended the use of heptane instead of hexane and demonstrated the method for the production of

16-hydropregnenolone acetate. We have also provided 1 kg each of pure diosgenin and 16-hydropregnonolene acetate as sample to Kurram Chemicals, to get evaluation of the products from the foreign pharmaceutical companies for marketting.

During the research and development work on the production of steroidal intermediates, we have collected sufficient starting material and prepared 16-DPA. These can be utilized for more detailed studies for other steroidal intermediates and steroidal drugs.

Project No:	S-KU/Chem (84/1)
Project Title:	Isolation and structural studies on the chemical constitutents of some indigenous Flowering Plants.
Name of Investigator:	Dr. Viqar-ud-Din
Project Particulars:	
-Duration	one year
-Date of commencement	1-6-1981
-Date of completion	31-5-1982
-Implementing Agency:	University of Karachi
-Total expenditure	Rs.44,600/-
Main objectives:	To carry out through investigation of the chemical constitutents of flowering plants abundantly available in and around Karachi. The pure compounds isolated as results of this work will be subjected to structural Pharmacological antibacterial and antitumour studies.

Summary of the Work Done:

In the present project, work was carried out on the isolated and structure of the chemical constitutents of the following plants of Pakistan.

1. Nepeta hindostana

2. Prosopis juliflora

3. Euphorbia granulata

The work on Nepeta hindostana led to the isolation of our new triterpenes named as nepeticin, nepetilin, nepetidin and neheptin besides hentriacontane, wax sitosterol, oleanolic acid, sitosterol glucoside and the flavonoids, dinatin, 7, 4-dimethylscutellarine and nepetine. The structural of two new triterpenes nepeticin and nepetidin were elucidated completely.

From the mesquite plant Prosopis juliflora, a number of alkaloids were isolated. The absolute configuration of julifloridine, an alkaloid reported earlier by the present authors was determined by spectroscopic means.

The main alkaloid of this plant namely juliflorine was found to inhibit the growth of a number of pathogenic bacteria and fungi. From the neutral triacontanol sitosterol and its glucoside were isolated.

The preliminary work on Euphorbia granulata led to the isolation of several neutral compounds (hydrocarbons esters and triterpenes) which are under investigation

Publication as a result of these Investigations

Ahmad, Viqar Uddin; Ali, S. Fasahat and Ahmad, Fafiq.	1980	Isolation of Solamargine from Solanum albicaule Kotschy. Planta Medica, 39, 186.
Ahmad, Viqar Uddin and	1979	Studies on the structure of Juliflorine, J. Chem. Soc. Pak., 1 (2): 137.
Ahmad, Viqar Uddin Bano, Shaheen; Voelter, Solfgang and fuchs, W.	1981	Chemical Examination of Nepeta hindostana (Roth) Haines. The structure of Nepeticin, Tetrahedron Letters, 22 (18) 1715.
Ahmad, Viqar Uddin Bano, Shaheen, Voelter Wofgang and Fuchs, W.	-	The structure of Nepetidin, a new triterpenoid from Nepeta hindostana, (Accepted for publication in Z. Naturforsch).

Usmanghani, K.; Saqib, Q Najmus, and Ahmad, Viqar Uddin	-	Occurence of Juliprosopine in Prosopis glandulosa Torr (in press).
Ahmad, Viqar Uddin, Saqib, Q. Najmus; Usmanghani, K.; Voelter, W. and Fuchs, W.	-	Triterpene Sapogenins from Primula denticulata (in press).

Project No:	S-KU/Chem (96)
Project Title:	Synthesis & Isolation studies towards Vinblastine and Vincristine and their novel derivatives.
Name of Investigator:	Dr. Atta-ur-Rehman.
Project Particulars:	
-Duration	3 years
-Date of commencement	1-10-1979
-Date of completion	30-9-1982
-Implementing Agency:	University of Karachi
-Total expenditure	Rs.4,38,000/-
Main objectives:	To investigate semi-synthetic approach to Vinblastine and Vincristine with particular reference to the feasibility of the synthesis of vinblastine and vincristine on a large scale. Chemistry of catharanthine and vidoline will be investigated with a view to synthesizing novel analogues of vinblastine with varying antitumour properties.

Summary of the Work Done:

During the first phase of the project a 3 acre farm of Catharanthus roseus plants has been grown in the Karachi University Campus which has provided a regular supply of leaves for isolation and synthetic studies. A large flash evaporator system was designed, fabricated and installed in one room of the institute building which has allowed fast and mild evaporations of 120

gallons of alcoholic extracts of the leaves per 8 hours day.

As a result of extensive isolation studies, procedures for the isolation of catharanthine, vindoline and vinblastine have been optimised and patented. A number of new alkaloids have been isolated from C. roseus which include 16-epi-19-S-vindolinine, fluorocarpamine-N-oxide, pleicar pamine and 16-epi-19-S-vindoline-N-oxide. The structures of these have been elucidated on the basis of I.R., U.V., PMR, CMR, mass spectrometry and chemical degradation.

Synthetic approaches to the anti-tumour alkaloids are described in depths, which include new synthesis of B-carboline and gambirtannine systems which are generally recognized as the biosynthetic precursors to the Aspidosperma and Iboga groups of alkaloids.

Publication as a result of these Investigations

Rehman, Atta-ur-Bashir, M.; Hafeez, M.; and Perveen, N.	1980	A rapid procedure for the isolation of catharanthine and vindoline from leaves of Catharanthus roseus, Pakistan Patent.
Rehman, Atta-ur-Ghazala, M., Sultant, N.; and Bashir M.	1980	Metal ion catalyzed reduction of indolic amides, A facile B-Carboline synthesis, Tetrahedron Letters, 21, 1773.
Rehman, Atta-ur	1979	Synthetic studies in the field of anti-cancer alkaloids. The synthesis of vinblastine and vincristine, J. Chem. Soc. Pakistan 1 (1),81.
Rehman, Atta-ur-.	1981	Synthetic studies in the field of Anti-cancer alkaloids - The synthesis of Vinblastine and Vincristine, Proceedings of 4th Asian Symposium on Medical Plants and Spices, page 222 (1980) Chem. Abstracts, 95, 98083p.

Rehman, Atta-ur-;Hasan, J.	1980	The synthesis of (+)-a- and B-Dihydrocleavamine (+)-16-Methoxycarbonyl dihydrocleavamine,(+)-Epi-ibogamine and (+)-Catharanthine, Tetrahedron, 36, 1063.
Rehman, Atta-ur-; and Mason, J. Harley	1980	The total synthesis of (+)-16-Hydroxydihydrocleavamine and the Partial Synthesis of Demethoxycarbonyldeoxyvinblastine, Tetrahedron, 36, 1057.
Rehman, Atta-ur-; and Ghazala, Maryam.	1981	Reaction of harmaline and its derivatives VII. Synthesis of 11-methoxyindoloquinolizidines by Photochemical cyclization of enamine intermediates,Heterocycles, 16-261.
Rehman, Atta-ur-; and Ghazala, Maryam.	1980	Reaction of harmaline and its derivatives VI. The partial synthesis of 11-methoxy nauclefine, Synthesis, 5, 372.
Rehman, Atta-ur.	1980	The synthesis of Vinblastine, Vincristine and vinrosidine, 12th International Symposium on the Chemistry of Natural Products, page, 245.
Rehman, Atta-ur; and Ghazala, Maryam	1982	Synthesis of Gambirtanninе derivatives of Photocyclization of Enamine Intermediates J. Chem. Soc. Perkin 1, 59.
Rehman, Atta-ur; Bashir, M.; Hafeez, M.; Perveen, N.; Fatima, J. and Mistry, A.N.		Studies on the anti-tumour alkaloids of Catharanthus roseus - A rapid procedure for the

	isolation of catharanthine, vindoline and vinblastine. Planta Medica. (accepted for publication).
Rehman, Atta-ur; Bashir, M.; Kaleem, S. and Fatima, J.; and	Isolation and structure of 16-api-19-S-vindolinine - A new indoline alkaloid from Catharanthus roseus Photochemistry (accepted for publication).
Rehman, Atta-ur-; Bashir, M.; Fatima, J.; and Mistry, A.N.	A rapid procedure for the isolation of vinblastine from the leaves of catharanthus roseus, Pakistan Patent App. No.141/82 dated 19.5.1985.

Project No:	C-QU/Chem (99)
Project Title:	Effect of Substituents on the Hydrolysis mechanism of Lactones.
Name of Investigator:	Dr. Mrs. Mashooda Hasan
Project Particulars:	
-Duration	one year
-Date of commencement	15-7-1980
-Date of completion	14-7-1981
-Implenenting Agency:	Quaid-i-Azam University, Islamabad.
-Total expenditure	Rs.31,772/-
Main objectives:	To synthesize a series of γ -Lactone and to study the hydrolysis mechanism by Mass Spectrometric media.

Summary of the Work Done:

Lactone rings occur in very important pharmacologically active compounds e.g. santonin, Pulchellin, withaferin. It has already been found that the stability of lactone rings is influenced by the number and type of substitutents present in the ring. The mechanism of hydrolysis of γ -Lactones is also influenced by the number and type of substitutents present in the ring. The mechanism of ester hydrolysis and its dependence on structure is well established. The esters derived from primary and secondary alcohols undergo hydrolysis through acyl oxygen bond fission while these esters derived from tertiary alcohols undergo hydrolysis through alkyl oxygen bond fission. However, the structure dependence of lactone hydrolysis, an analgous reaction is not known with certainity. For this purpose ten differently substituted - Lactones were synthesized by the methods reported in literature and the mechanism of hydrolysis of each γ -Lactone was found by mass spectrometry using H_2O^{18}. Each lactone was hydrolysed first in ordinary water and then in labelled water having 20% O^{18}. The two lactones i.e. normal and labelled obtained after hydrolysis were subjected to high resolution mass spectrometric analysis. General fragmentation pattern of γ -Lactones were established and the mechanism of each fragment was found After having established the general fragmentation pattern, of normal lactones subjected to parallel studies. The peak and ion intensity pattern of each labelled lactone was determined and the position of oxygen O^{18} was traced in the fragments whose molecular origin is known with certainity, it is possible to deduce the nature of bond split i.e. whether the hydrolysis is proceeding through acyl oxygen bond fission or through alkyl oxygen bond fission. It has been found that γ -Lactones having a primary or secondary γ -carbon undergo hydrolysis through acyl oxygen bond fission while γ -lactones having a tertiary γ -carbon undergo hydrolysis through alkyl oxygen bond fission.

Publication as a result of these Investigations

Two research papers entitled; General mass spectral fragmentation pattern of γ -lactones and "Studies on the influence of substitutents on the mechanism of hydrolysis of γ -lacones have been submitted for publication.

Project No:	S-KU/Earth (4)
Project Title:	Terrain analysis and its application to urbanization.
Name of Investigator:	Mr. Mir Jan Mohammad
Project Particulars:	
-Duration	Two years
-Date of commencement:	February, 1975
-Date of completion	January, 1977
-Implementing Agency:	University of Karachi
-Total expenditure	Rs.1,06,958/-
Main objectives:	To study the geology, hydrology, geomorphology and soils in the greater Karachi area with a view to evaluate its potential state for better urbanization and future planning of optimum use and to investigate the natural hazards, sheet flooding, land slides, solifluxion, coastal innundation, wind erosion etc.

Summary of the Work Done:

The study of land complexes and the attendant geomorphic changes are of vital interest to any project related to urbanization and industrialization. The Greater Karachi Area constituted a part of a through nested at the southern tip of a mountain-belt of Tertiary age which has been susceptible to post-Tertiary and neotectonic movements. As such the suitablility of the land for the major urban and industrial development warrants detailed terrain analysis. It is also required to investigate into the kind of correspondence that exists between the geomorphology, geology and soils found in the area. Because such as correspondence determines the conditions of equilibrium or disequilibrium prevailing therein. This is further emphasized by the very location of the area in an arid region were processes of denudation act spasmodically and relentlessly.

The delineation of geomorphic zones and land complexes within the area of study as well as evaluation of the terrain based on ariphoto scanning maps study supplemented by actual fields checks and site investigations was undertaken. This study is perhaps first one of its kind in this part of the planning and management of land resources of this area, specifically for urban and industrial development. However, the envisaged correspondence between geomorphic and geological processes and soil evaluation could not be established because the second phase of the study could not be undertaken.

Terrain analysis aims at the classification of land in terms of potential use into units called land systems and complexes which can be recognized on the air photographs and can be located in ground surveys. Such units have characteristics pattern of relief, soil and vegetation. These are significant in terms of existing and potential land use.

In the present study an attempt was made to assess the land forms and land use inter relationship based on the concept developed by Christian and Stewart of C.S.I.R.O. Australia in 1964.

Project No;	P-PU/Earth (12)
Project Title:	Land resources Management in Jhelum District of Barani Region.
Name of Investigator:	Dr. Miss M. K. Elahi
Project Particulars:	
-Duration	One year
-Date of commencement:	January, 1978
-Date of completion	January, 1979
-Implementing Agency:	Punjab University, Lahore
-Total expenditure	Rs.1,10,320/-
Main objectives:	To evaluate and examine the existing patterns of rural-urban land use in the Potwar region of the Punjab i.e. the

district of Jhelum, Rawalpindi and Cambellpur to understand the factors and processes which shaped this pattern.

The pattern analysis would provide the frame work for further planning and development of land use productivity in these areas.

Summary of the Work Done:

The area of study, Jhelum district, shares 9.7 percent of the area, 5.9 percent of the range lands, and 4 percent of the barani lands of the Punjab. It has a substantial share of minerals of the province viz, coal, salt,gypsum and oil. Its infra structure is better than that of other barani areas of Punjab, except Rawalpindi district. On the basis of its existing active and dormant resources the district has quite a bright future and thus deserves scientific examination. In the conduct of the present enquiry, the data constitutes published works, field surveys and the unpublished records of village Patwaris. The toposheets of 1 to 50,000 and quarter ninch maps of the area have also been used for detailed study. The unpublished records of Patwari were principally derived from Lal Kitab, Khasra Girdawari and the Cadestral map known as Shajra and the large scale tehsil map with village boundaries.

The field survey of 62 selected settlements from various ecological zones have been carried out on the basis of 10 percent random sampling. A questionaire in Urdu was distributed and results tabulated from the information thus collected.

Village is the smallest unit in the hierarchy of administration. Much of the data has been processed on the basis of village/Mauza/. rural settlement.

This report of the Jhelum district is directed towards recording and mapping the data to find areal variations and correlations between spatial distributions of the various phenomena physical and 'cultural'. An attempt has been made to identify the problems, suggested remedial measurement and indicate directions for future development.

Plans for the socio economic betterment of the area should be so drawn that all the resources, active and dormant be utilized

for optimal benefit for the longest possible span of time. For drawing a development plan of the area it is important to prepare a proper inventory of resources. In this respect the present study has been mostly concerned with land resources - particularly - agricultural resources, population and settlement.

Another aspect of planning is related to the identification and location of problems of the area so that remedial measures could be adopted. Remedial measures are applied to existing problems but preventive measures could be applied to avoid the creation of new problems on the basis of past experiences.

AREAS OF DEVELOPMENT

On the basis of our preceeding study of land resources, land management, distribution and growth of population and hierarchy of settlement, the areas that emerge to be prominently capable of agricultural improvement are lised below:-

Best areas:

1. Eastern part of Jhelum tehsil generally comprising the old river terrace zone. It is an area where a combination of better socio-economic and physical resources exists.

2. Part of the piedmont plain of Jhelum and Pin Dadan Khan tehsils. Large tracts of plain area are available and have the potentials of improving the ground water resources.

3. Basin plains particularly Salt Range basin plains and Chakwal basin plain possess fertile soils and great agricultural potentials.

Second best areas:

4. The eastern part of the dissected, patchy cultivated area between Nili hills and Jogi Tila.

5. The northern and eastern parts of Chakwal tehsil and northern parts of Jhelum tehsil, north of Nili Range.

6. Western part of Chakwal tehsil and southwestern part of Pind Dadan Khan.

IDENTIFICATION OF PROBLEMS

On the basis of the study so far conducted, the following outstanding problems of the region have been identified:-

1. Moisture deficiences.
2. Low intensity of cropping
3. Traditional cropping techniques
4. Low yields
5. Over grazing, deforestation and soil erosion.
6. Slow growth of non agrarian economic activities
7. Poorly developed infra structure in some areas
8. Lack of motivation to solve these problems.

Project No:	F-PU/Envr (9)
Project Title:	Atmospheric and Water Pollution studies of the Urban and Industrial areas of Pakistan.
Name of the Investigator:	Dr. Noor Mohammad
Project Particulars:	
-Duration	2 years
-Date of commencement	Ist Janaury, 1980
-Date of completion	31st December, 1982
-Implementing Agency:	Peshawar University
-Total expenditure:	Rs.1,64,300/-
Main objectives:	To study (i) the extent of Water Pollution in the urban and industrial areas of Peshawar and Nowshera so as to provide Scientific and Technical data to the various industries regarding their waste effluents which are continuously discharged into waters of the Kabul river.

Summary of the Work Done:

Industrialisation of a country is a symbol of development. The industries are generally installed near big cities. The effluents

from these industries gradually bring about some changes in the surrounding environment such as pollution of air and water. Water pollution is caused mainly due to uncontrolled disposal of liquid wastes whereas the air-pollution in mainly due to discharge of gases and burning of hydrocarbons etc.

The investigations were carried out in urban and industrial areas, with a view to analyse drinking water and industrial waste water. The samples of drinking water taken from the districts of Peshawar, Mardan, Kohat, Bannu and D. I. Khan. The industrial waste water was collected from Nowshera industrial area and the river water was taken from River Kabul into which the industrial wastes of Nowshera are dropped. The parameter used for the study of chemical pollution in different sources of water included: Temperature, pH, Turbidity, Alkalinity, conductivity, Hardness, and Dissolved oxygen. Various analytical techniques were applied for measurement of ions of Na, K, ea, Fe N, cu, zn, etc. and the results obtained were compared with international standards.

Project No.:	P-PU/Phys (30)
Project Title:	Trapping level and mobile charge determination in thin solid films.
Name of Investigator:	Dr. F. M. Nazar
Project Particulars:	
-Duration	3 years
-Date of commencement	1-7-1979
-Date of completion	30-6-1982
-Implementing Agency	Punjab University, Lahore
-Total expenditure	Rs.1,24,738/-
Main objectives:	To determine the density and distribution in energy of the trapping centres in different dielectrics. Mobile charge will also be determined. These two parameters will be used to characterise the films for their use as passivating and

marking layers in components technology. This will be tried on limited scale to improve preparation methods and to minimise these two sources of trouble in device performance

Summary of the Work Done:

Photoconduction measurements in the photon energy range 1.5 eV-6.2 eV has been made on cadmium zinc photosphate glasses, p-GaSe single crystal and anodic tantalum oxide thin films. Phototransients in cadmium phosphate glass samples have also been studied. The measurements yield photoconductive band gaps and some information about the trapping levels in these materials.

The photoconductive band gap in cadmium zinc phosphate glasses shows a slow decrease with an increase in the applied field and the zero field band gap in these materials is 4.73 eV. The optical band gap at a particular applied field decreases with increasing ZnO percentage. The phototransients in cadmium phosphate glass samples show a linear rise with field while their decay time tends to saturate at higher fields. For shorter times, $\Delta I \propto \exp(-t)$ while for longer times there is a departure from this exponential behaviour.

The investigation has been made to measure the photoconduction in p-GaSe single crystals, cadmium phosphate as well as cadmium zinc phosphate glasses and tantalum oxide thin films in the spectral energy range 1.5 eV-6.2 eV. Photoconductive band gap has been obtained by the extrapolation of the linear region of the sharp rise in the photoresponse curves. In the case of cadmium zinc phosphate glasses, the composition dependence of the photoconductive band gap has also been investigated. Results have been discussed on the basis of energy bands for non crystalling materials.

Publication as a result of these Investigations

Nazar, F.M.	1980	The study of Trapping Levels in Anodic AlO films using Thermally stimulated currents. Int. J. Electron (GB). 48, 315.
Nazar,F.M. & Bhatti, M.A.	1981	Conduction in al_2O_3 Films Grown by Evaporating

		High Purity Aluminum in Oxygen Ambients. Ing. J. Electron (GB) 50, 119.
Nazar, F.M. Ghauri, M.A. & Bokhari,W.H.	1981	Field dependence of the Optical Band Gap in ($CdO-P_2O_5$) Glass. Int. J. Electron (GB). 50, 193.
Anis, M.K.,Zaheer,M.Y. and Nazar, F.M.	1981	Photoconduction in GaSe Thin Films Int. J. Electron (GB). 51.87.
Ghauri, M.A.; Bokhari, W.H. & Nazar,F.M.	1981	Band Gap Variation with Composition in cadmium Phosphate Glasses. Int. J. Electron (GB). 51.201.
Rahman, K.U. and Nazar, F.M.	1981	Preparation and Merfacila Studies of $Si-SiO_2$ System. J. Nat. Sci. & Maths. 21.27.
Nazar, F.M. and Malik, N.	1981	Photoconduction in GaSe single Crystal. Int. J. Electron (GB) 51, 187.
Ghani, M.A. Nazar G.M. & Bokhari, W.H.	1981	Band Gap in Cadmium Zinc Phosphate Glass. J. Non-Crystalline Solids, 46, 187.
Nazar,F.M. Zaheer, M.Y. & Bokhari,W.H.	1981	Photoconduction in Abiduc Tantalum Oxide Thin Films. Int. J. Electron (GB) (Accepted).
Nazar, F.M. and Ghauri, M.A.		Composition Dependence of Photoconduction Band in Cadmium Zinc Phosphate Glasses J. Mater. Sci. (Accepted).
Nazar, F.M.		Phototransients in (30 mo 1% CdO 70 mo 1% P_2O_5) Glass. Int. J. Electron (GB) (Accepted).
Nazar, F.M. Ghauri, M.A. & Bokhari, W.H.		Temperature Dependence of Photoconductivity in $CdO-P_2O_5$ Glass. Int. J. Electron (GB) (Accepted)

Project No:	C-QU/Phys (33)
Project Title:	An investigation of the weak Electromagnetic Interaction of Particles.
Name of Investigator:	Dr. M.S.K. Razmi
Project Particulars:	
-Duration	One year
-Date of commencement	September, 1980
-Date of completion	August, 1981
-Implementing Agency:	Quaid-i-Azam University, Islamabad
-Total expenditure:	Rs.31,232/-
Main Objectives:	To analyse (i) best experimental data on various distribution of hardrons, particularly the multiplicity distribution and reduce the quark patron structure various hardone and precise information about the quark-fragmentation function; (ii) di and tri leptonic events (iii) the jet structure in the electron position annihilation at high energy.

Summary of the Work Done:

The study concerned about the distribution functions of quarks within hadrons and the fragmentation functions of quarks where the latter described how a quark may fragment and, in due course of time, evolve into shower of hadrons. A candidate for this study, we have looked at the production of charmed mesons (In particular, F-meson which is constituted by a charm quark and an antistrange quark) in hadronic collisions at high energies.

Cross-sections for F-meson production from proton-proton and pion-proton collisions at high energies (20-100 GeV in the centre of mass frame) have been estimated. Considerable effort was directed at the development of a computer program to handle the multidimensional intergration involved in this computat-

ion. The Gaussian Quadrature technique was used to obtain rough estimates. Finally, however, recently developed technique VEGAS was used which does multidimensional integration utilizing the Monte Carlo technique. The variation of the cross-section with different distribution functions was also studied.

The important findings as a result of this research are that (i) the F-meson production cross-section does receive a contribution from the central gluonic component though the major contribution comes from the diffractive gluonic component (ii) The individual contributions rise rapidly with the scattering angle, levelling off around $\theta \sim 60°$. (iii) for fixed value of the scattering angle, the cross-section is large at small transverse momenta but falls off rapdily at large values of this kinematic variable.

These results could serve as tests of quantum chromodynamics. They should equally provide good checks on the analytic forms of the hadron structure functions and the quark fragmentation functions.

(b) Second Annual Reports

The second annual reports of the following projects were received and processed by the Foundation during the period under report.

Project No.	Title of the Project
P-PU/Phys (30)	Trapping levels and mobile charges determinations in thin solid films.
JPMC/Med (39)	Studies on insulin levels and its antagonism in diabetic patients.
S-ZSD/Bio (90)	Survey of the Reptilian fauna of Sind.
S-KU/Chem (96)	Synthesis and Isolation studies towards vinblastine and vincristine and their noval derivatives.
S-JPMC/Med (38)	Chemical studies on Cataractus human lenses.
SU-Chem (10/1)	Structural and synthetic studies in some B-Carboline bases.

(c) First Annual Reports

The first annual reports of the following projects were received and processed further by the Foundation.

Project No.	Title of the Project
S-KU/Bio (14/1)	Investigation on wood anatomy of conifers and polysaccharide components of Euclyptus, poplars, etc.
P-PU/Bio (93)	Morphophysiological and metabolic hazards of chlorinated insecticides on small mammals in Pakistan.
S-ZSD/Bio (90)	Survey of reptilian Fauna of Sind.
P-AU/Bio (40/1)	Control of some mammalian and Avian Pests.
S-KU/Bio (99)	Catalogue/Records of the Karachi University Zoological Museum.
P-SGR/Med (48)	Cholelithiasis and incidence of Carcinoma in Gall Bladder diseases.
P-AU/Agr (31/1)	Cytogenetic studies of Branched Ear derivatives in wheat.
P-PU/Bio (74)	Biological control of plant diseases caused by root infecting pathogenic fungi.
P-PU/Envr (3/1)	Ecological studies on fresh water Hyphomycetes.
P-PU/Chem (106)	Synthetic and catalytic aspects of new transition metals. Alkyls and Aryls.
P-AU/Agr (64)	Ecological studies on some important weeds of wheat.
P-AG/Env (23)	Hydrobiological study of the lake of Punjab and NWFP.
P-CSIR/Chem (103)	Microbial production of xanthane gum for industrial use.
P-CSIR/Chem (107)	Pilot plant production of Butanol by fermentation.

CHAPTER - 3

ORGANIZATION AND ADMINISTRATION

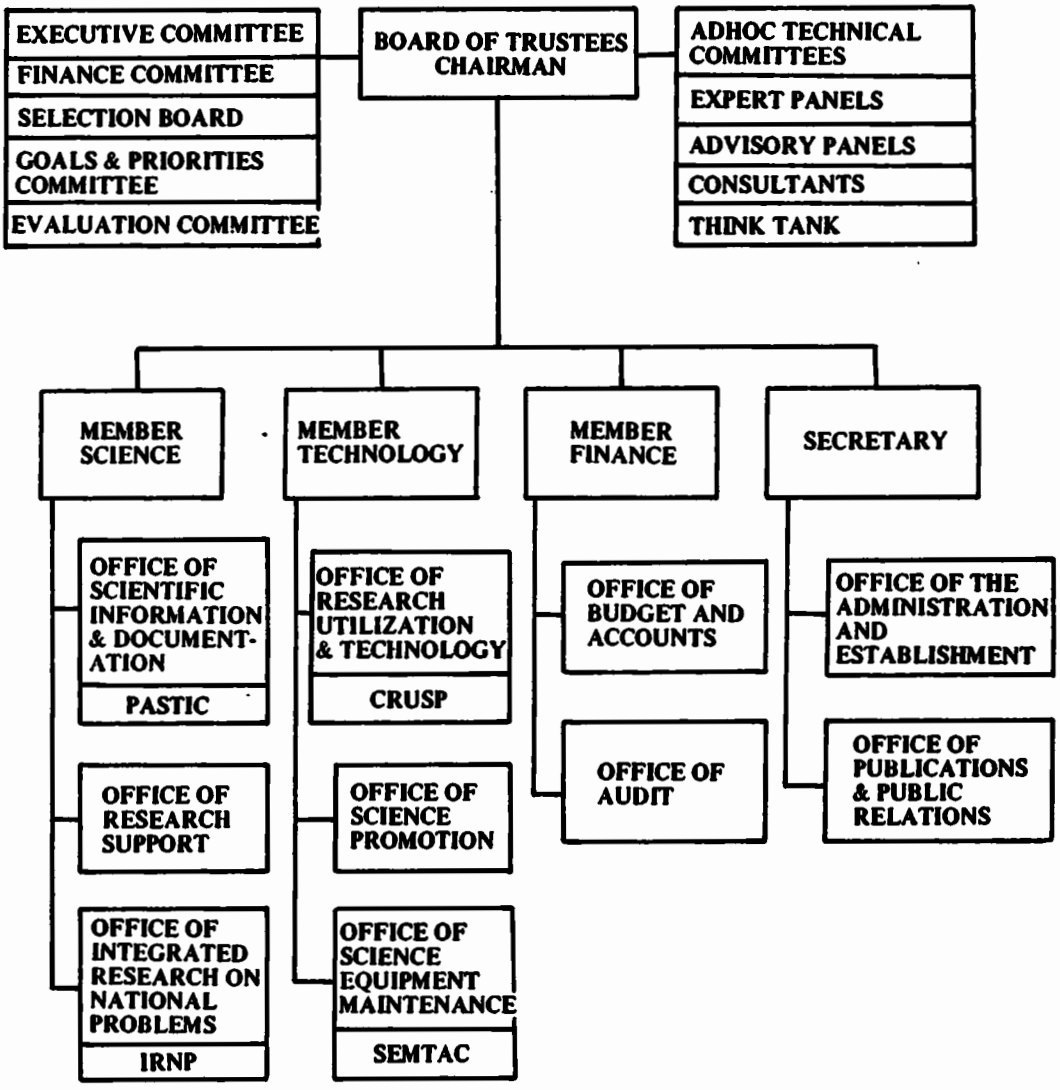
The ultimate organizational and administrative structure of the Foundation is given in the charts on page 65 and 66 The staff in position during the report period is as under:-

OFFICERS

S.No.	Designation	Number
1.	Chairman	1
2.	Member (Science)	1
3.	Member Finance	1
4.	Secretary	1
5.	Principal Scientific Officer	1
6.	Deputy Director (F&A)	1
7.	Senior Scientific Officer	1
8.	Scientific Officer	4
9.	Assistant Scientific Officer	1
10.	Deputy Secretary	1
11.	PS to Chairman	1
12.	Accounts & Audit Officer	1
13.	Science Promotion Officer	1
14.	Supporting clerical staff	38
	Total	54

In addition to the whole-time staff member of the Foundation, there are about 200 scientists and technologists in various Universities/research organizations who are acting in an honorary capacity as reviewers of the research proposals and member of the Technical Committees or Principal Investigators at the PSF supported projects.

PROPOSED ORGANIZATION
PAKISTAN SCIENCE FOUNDATION



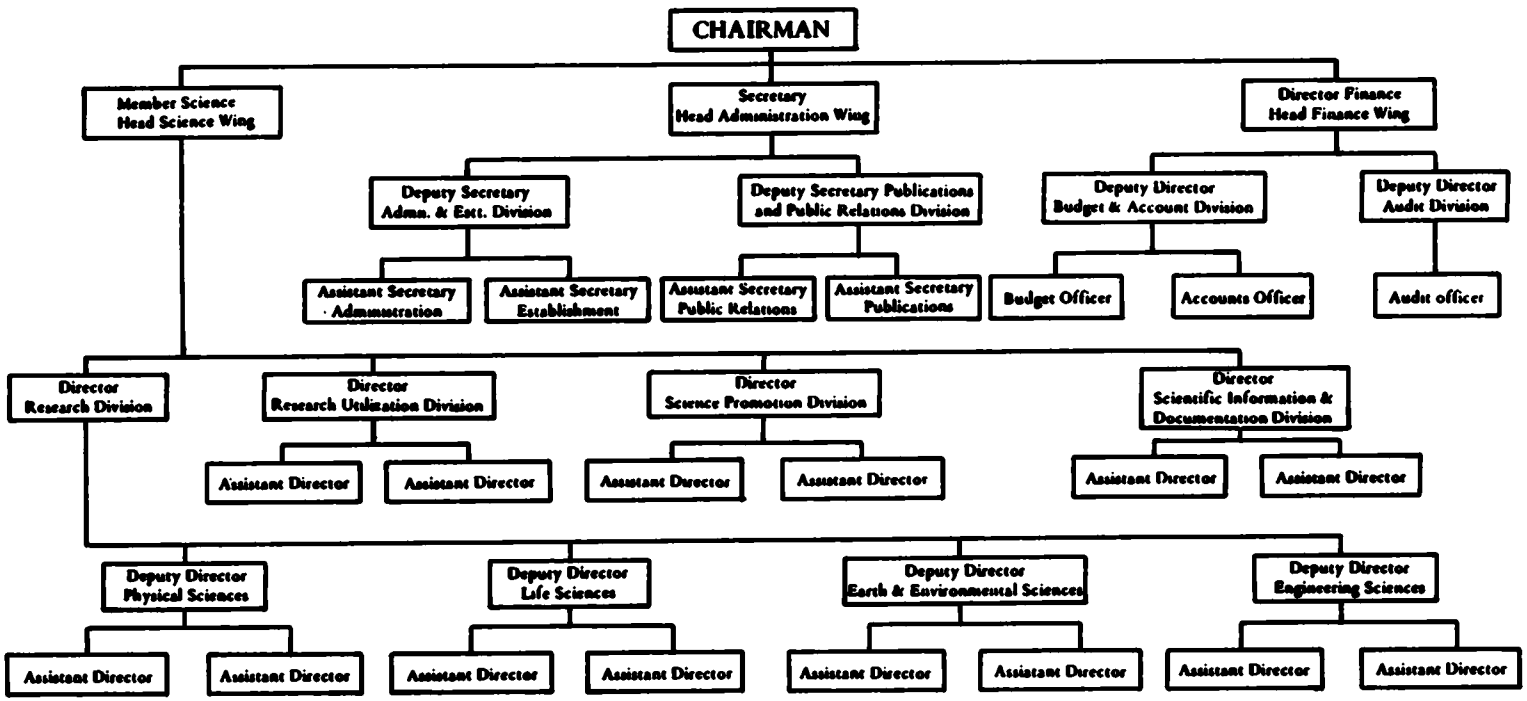
PASTIC : PAKISTAN SCIENTIFIC AND TECHNOLOGICAL INFORMATION CENTRE

CRUSP : CENTRE FOR RESEARCH UTILIZATION AND SPECIAL PROJECTS

IRNP : INTEGRATED RESEARCH ON NATIONAL PROBLEMS

SEMTAC : SCIENCE EQUIPMENT MAINTENANCE TECHNICAL ASSISTANCE CENTRE

PAKISTAN SCIENCE FOUNDATION
ADMINISTRATIVE STRUCTURE
1975



CHAPTER - 4

AUDITORS REPORT

A.F. FERGUSON & CO.
CHARTERED ACCOUNTANTS

OTHER OFFICES AT
KARACHI-LAHORE

STATE LIFE BUILDING
FIRST FLOOR
SHAHRAH-E-SHERSHAH
P.O. BOX 90
RAWALPINDI
PAKISTAN
TELEGRAMS: BALANCE
TELEPHONE: 64241
68154

December 31, 1984

1100

The Chairman,
Board of Trustees,
Pakistan Science Foundation,
Islamabad.

Dear Sir,

PAKISTAN SCIENCE FOUNDATION
ACCOUNTS FOR THE YEAR ENDED JUNE 30,1982

We enclose five copies of the balance sheet as at June 30, 1982 and the receipt and expenditure account for the year ended on that date together with our report thereon initialled by us for identification purposes. We shall be pleased to sign our report after the accounts have been considered and approved by the Board of Trustees and signed by the Chairman and atleast two other members of the Board. Our comments arising from the audit of the accounts are given in the following paragraphs. Several of the comments given below have also been reported to you by us in previous years and being applicable to the accounts for the year under report have again been reproduced.

2. Accounts

2.1 Liabilities

Although the Foundation operates an unfunded gratuity scheme, no provision has been made in the accounts for liability accuring in this respect upto the balance sheet date. In terms of the current policy of the Foundation such liability is charged in

the accounts in the year in which such gratuity is paid.

2.2 Fixed assets

We have observed that the lease deed in respect of land has still not been executed.

2.3 Research projects in progress

a) In absence of detailed lists showing the status of research grants disbursed for each subject no segregation could be made of grants related to projects in progress, completed projects or abondoned projects as at June 30, 1982.

b) We have observed that audit reports of some of the completed projects were not submitted as required by the terms and conditions related to disbursement of the grant by the Foundation.

2.4 Cash and bank balances

The National Bank of Pakistan has confirmed to us a balance of Rs.131,493 as at June 30, 1982 in the name of Pakistan Science Foundation. This balance has not been included in the accounts as we understand it relates to the PSF employees contributory provident fund.

2.5 Cheques issued and subsequently cancelled

Cheques aggregating Rs.273 issued during the year were cancelled subsequent to the year end.

3. System of internal control

3.1 In respect of advances given to employees for the purchase of motor cycle and cars, the requirement specified in the Foundation's Rules related to the mortgage of the purchase vehicle to the Foundation and obtaining a comprehensive insurance cover for it were not complied with.

3.2 Detailed fixed asset records are not maintained by the Foundation. We recommend that proper fixed assets records are maintained giving full details of the value of each item, year of purchase, identification mark, annual depreciation charge and the written down value at he end of each year. Fixed assets should also be physically verified periodically and the result of physical verification be agreed with the fixed assets records.

3.3 We have observed that no record is maintained for items of capital nature returned on completion of research projects. In order to ensure adequate control over such items we recommend that the Foundation should develop a policy for accounting of such assets in its book. Alternately atleast a memorandum record is maintained of all such items.

3.4 We observed that the cost of the UNESCO Coupons for the purchase of the scientific books, journals and other specified scientific equipments is expensed when such coupons are purchased. We recommend that in order to ensure proper control over such coupons, their purchase cost should be recorded initially as an asset and adjustments be made as and when coupons are utilised for an approved purpose.

3.5 No Income Tax was deducted from payments to supplier's as required under the Income Tax Law. We recommend that this statutory requirement is strictly complied with to avoid penal consequences.

3.6 The books of accounts of the Foundation are being maintained on a single entry system whereas accounts under review are prepared on a double entry system. This creates a number of problems inter-alia identification of accruals and prepayments as data is not readily available under single entry system to facilitate the preparation of accounts under double entry system.

4. We have noticed that there was no Board of Trustees during the year under report and in the absence of the Board, the Executive Committee was carrying out its functions.

5. We take this opportunity to express our appreciation of the courtsey and co-operation extended to us by the management and staff of the Foundation during the course of our audit.

Yours truly

sd/-

A.F. FERGUSON & CO.

A.F. FERGUSON & CO.
CHARTERED ACCOUNTANTS

KARACHI - LAHORE - RAWALPINDI

AUDITORS' REPORT

We have examined the annexed balance sheet of Pakistan Science Foundation as at June 30, 1982 and the annexed receipts and expenditure account for the year ended June 30, 1982 and subject to the contents of our letter 1100 dated December 31, 1984, we 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;

c) the receipts of the Foundation during the year ended June 30, 1982 comprise of grants received from the Federal Government. We are satisfied that the grant so received has been spent on the objects for which it was made, within the specified time limit and there was no unspent balance expect that refunds aggregating Rs.35,941 were received during the year related to grants disbursed during the year and in previous years (note 4 to the accounts), which refunds wee not surrendered to the Federal Govt. upto the balance sheet date. We have also satisfied ourselves about the propriety of the disbursement made from the grant.

Sd/-

Chartered Accountants
Rawalpindi

PAKISTAN SCIENCE FOUNDATION

BALANCE SHEET AS AT JUNE 30, 1982

FUNDS AND LIABILITIES	NOTE	1982 Rupees	1981 Rupees	PROPERTY AND ASSETS	NOTE	1982 Rupees	1981 Rupees
GENERAL FUND				FIXED ASSETS	5	3,327,430	3,206,920
Opening balance		3,297,748	3,248,341	RESEARCH PROJECTS IN	2	29,881,506	25,277,021
Prior year adjustment		--	1,095				
				CURRENT ASSETS			
Receipt and expenditure account surplus for the year		664,171	181,195	Sundry Debtors		58,000	6,520
		3,961,919	3,430,631	Advances, deposits and prepayments	6	695,457	267,175
Less: Refund of unutilised grants disbursed during the year shown under grants refundable to the Government (note 4)		8,468	132,883	Cash and Bank balances	7	165,976	132,883
		3,953,451	3,297,748			919,433	406,578
RESEARCH SUPPORT GRANTS	2	29,881,506	25,277,021				
CURRENT LIABILITIES							
For expenses	3	124,588	182,867				
Grants refundable to the Government	4	168,824	132,883				
		34,128,369	28,890,519			34,128,369	28,890,519

These accounts should be read in conjunction with the annexed notes

Chairman Trustee Trustee

PAKISTAN SCIENCE FOUNDATION
RECEIPTS AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED JUNE 30, 1982

	Note	1982 Rupees	1981 Rupees
Grants received		8,307,908	6,000,000
Less Grants paid			
Research & Institutional support	8	4,604,485	3,272,625
Scientific Societies & professional bodies		775,000	405,000
Scientific seminars & conferences		213,784	343,150
Travel grant for science conference & seminars		380,232	144,023
Scientist pool subsistence allowance		194	18,619
Other function	9	678	204,100
		5,974,373	4,387,517
		2,333,535	1,612,483
Administrative expenses	10	1,669,364	1,445,431
		664,171	167,052
Miscellaneous receipts		-	14,143
		664,171	181,195

These accounts should be read in conjunction with annexed notes

Sd/-	Sd/-	Sd/-	Sd/-
A.F.FERGUSON & CO.	Chairman	Trustee	Trustee

PAKISTAN SCIENCE FOUNDATION
NOTES TO THE ACCOUNTS FOR THE YEAR ENDED JUNE 30, 1982

1. Significant accounting policies

1.1 Grants received

Grants received from the Government of Pakistan are accounted for on receipt basis.

1.2 Fixed assets

Fixed assets are stated at cost less accumulated depreciation except leasehold land which is valued at cost. Foxed asets acquired for specific research projects are treated as research project expenditure.

1.3 Depreciation

Depreciation on fixed assets is charged on reducing balance method at the following annual rates.

	%
Furniture and fixture	6
Office equipment and air-conditioners	15
Motor vehicles and bicycles	20
Library books	5

2. Research support grants

The grants paid for the performance and execution of the research projects are being carried forward in the accounts of the Foundation and have not been adjusted for completed projects.

3. Current liabilities

These consist of the following:-

5. **Fixed assets**

	COST			DEPRECIATION		
	As at July 1, 1981	Additions during the year	As at June 30, 1982	For the year	As at June 30, 1982	Written down value as at June 30, 1982
Leasehold land	2,853,750	106,503	2,960,253	--	--	2,960,253
Furniture & Fixture	207,495	10,961	218,456	9,173	74,750	143,706
Office equipment	146,761	58,255	205,016	17,229	107,385	97,631
Air conditioners	74764	--	74,764	3,189	56,692	18,072
Motor vehicles	259,823	--	259,823	25,179	159,105	100,718
Bicycles	680	--	680	87	332	348
Library books	9,912	--	9,912	352	3,210	6,702
Rupees:-	3,553,185	175,719	3,728,904	55,209	401,474	3,327,430
1981 Rupees:-	3,423,371	129,814	3,553,185	54,753	346,265	3,206,920

Liabilities for expenses	1982 Rupees	1981 Rupees
Scientist pool subsistence allowance	-	1,500
Salaries and other benefits	47,256	78,207
Honorarium	500	-
Audit fee	42,500	30,000
Other administrative expenses	34,332	73,160
	124,588	182,867

4. Grants refundable to the Government

Balance brought forward	132,883	4,167
Amount refunded during the year related to grants disbursed		
During the year	8,468	128,716
In prior years	27,473	-
	35,941	128,716
5. Fixed assets	168,824	132,883

6. Advances, deposits and pre-payments.

	1982 Rupees	1981 Rupees
These are made up of		
Advances to staff	8,887	-
Deposits	4,600	4,600
Prepayments	681,970	262,575
	695,457	267,175

7. Cash and bank balances

	1982 Rupees	1981 Rupees
In hand	1,464	1,419
With Bank	164,512	131,464
	165,976	132,883

8. Research and institutional support

Maths and Computing Sciences	9,985	9,875
Physical Sciences	109,687	221,873
Chemical Sciences	756,625	562,427
Biological Sciences	487,685	113,077
Earth Sciences	30,730	19,728
Environmental Sciences	141,510	96,198
Engineering Sciences	-	49,050
Agricultural Sciences	155,649	78,195
Medical Sciences	1,065,164	447,109
Institutional Support	1,842,000	1,650,064
Oceanography	-	18,779
Utilisation	-	-
Honoraria	5,450	6,250
	4,604,485	3,272,625

9. Other functions

Scientific centres & herbaria	-	157,600
Information & Documentation	-	3,500
Awards and Prizes	-	23,000
Scientific survey and collection of statistics	150	20,000
Man and biosphere programme	528	-
	678	204,100

10. Administrative expenses

	1982 Rupees	1981 Rupees
Salaries and other benefits	998,154	772,931
Travelling local	70,178	33,168
Office rental	145,502	142,080
Water,Electricity & Gas	29,291	20,041
Postage, Telephone & Telegrams	124,165	176,563
Printing & Stationery	56,752	13,307
Vehicle running & maintenance	97,465	166,037
Newspapers & Periodicals	7,867	6,282
Liveries and Uniforms	7,335	3,038
Entertainment	23,238	23,812
Repairs & maintenance	5,427	8,177
Depreciation	55,209	54,753
Miscellaneous expenses	14,519	5,244
	1,635,102	1,425,433
Audit Fee	15,000	13,000
Advertisement	19,262	5,226
Legal expenses	-	1,772
	1,669,364	1,445,431

Sd/- Sd/- Sd/-

Chairman Trustee Trustee

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 Paksitan.

(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, be notification in the official Gazette, established 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 a financing agency for:-

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

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

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

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

(v) the promotion of scientific societies, associations and academies engaged in spreading the cause of scientific knowledge in general or in the pursuit of a specific scientific discipline 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 an 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 adminstration of its funds, shall vest in a Board of Trustees consisting of the following numbers namely:-

Whole-time members

(i) the Chairman

(ii) one eminent scientist;

(iii) the Director of Finance;

to be appointed by the President;

Part-time members

(iv) the Chairman of the National Science Council;

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

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

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

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

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

8. MEETING OF THE BOARD:- (1) The meeting of the Board shall be held at least twice a year and shall be presided over 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 Execuitve Committee such of its power and functions as it may consider necessary.

12. AD HOC COMMITTEE:- The Foundation may set up ad-hoc committee 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) donation and edowments; and

(c) income from other sources.

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

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

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

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

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

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

17. ANNUAL REPORT:- (1) the annual report of the Foundation which shall, among other things, clearly bring out the benefits 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.

Annexure-II

LIST OF SANCTIONED PROJECTS DURING THE YEAR 1981-82

Title of scheme	Amount sanctioned	Name of Principal Investigator & organization supported
Agricultural Sciences		
Standardization of various methods for the determination of available micronutrients and to determine the critical levels of various micronutrients using wheat,maize as test crop. F-AU/AGR (74)	2,43,740/-	Dr. Jahangir Khan Khattak, Associate Professor and Chairman, Deptt. of Soil Sciences, University of Peshawar.
Biological Sciences		
i) Studies on vertebrate fossils of Pakistan P-PU/BIO (102)	3,12,138/-	Dr. Abu Bakr, Department of Zoology University of Punjab Lahore.
ii) Study of Biology of vertebrate pests of Baluchistan. B-BU/BIO (107)	89,554/-	Dr. Maqsood Ali, Associate Professor, Department of Zoology, University of Baluchistan Quetta,
iii) A qualitative survey of Nodulating Ability of Legumes of Pakistan. S-KU/BIO (109)	2,28,788/-	Dr. Mahmood Ahmad, Professor of Botany, University of Karachi.
iv) Soil,vegetation and termites, their interrelationship in Baluchistan. B-BU/BIO (111)	2,60,278/-	Dr.Saeed Iqbal Zafar Department of Botany, University of Baluchistan Quetta.
Chemical Sciences		
i) Studies on the food	83,720/-	Dr. Amanullah Shah

	potential of indigenous algae. P-UET/CHEM (118)		University of Engineering & Technology, Lahore.
ii)	Industrial enzymology and their characterization S-SU/CHEM (125)	1,74,400/-	Dr. Abdul Rehman Memon, Associate Prof.,Institute of Chemistry, University of Sind, Jamshoro.
iii)	Studies on plants of medicinal and nutritional value. S-CSIR/CHEM (129)	1,39,800/-	Dr. S. A. Warsi, Pakistan Council of Scientific & Industrial Research Laboratories, Karachi.
iv)	Pilot Plant Production of Butanol by fermentation P-CSIR/CHEM (107/1)	18,230/-	Dr. M. A. Qadeer, Food Technology & Fermentation Division, PCSIR Labs., Lahore.
v)	Investigation of Reactivity of Phosphate esters. P-PU/CHEM (130)	78,220/-	Dr. Muhammad Younas, Associate Professor, Institute of Chemistry, Punjab University, Lahore.
vi)	Catalyatic Production of industrial solvents from natural gas. P-GSL/CHEM (131)	1,86,800/-	Lt.Col. Abdul Hamid Tahir, GHQ Science Laboratory, Chaklala, Rawalpindi.
	<u>Environmental Sciences</u>		
	Pollution due to industrial waste and methods for its control S-KU/ENVR (21)	99,930/-	Dr. M. A. Salam, Department of Applied Chemistry, University of Karachi, Karachi.
	<u>Mathematics and Computing activity.</u>		
	Higher order variational problem in group variables. P-GC/MATH (12)	15,770/-	Dr. Munawar Hussain, Professor of Mathematics, Government College Lahore.
	<u>Physical Sciences</u>		
	Some aspects of thermo-	96,500/-	Dr. G. Murtaza,

	nuclear fusion. C-QU/PHYS (36)		Department of Phyics, Quaid-i-Azam University,Islamabad
	Medical Sciences		
i)	Sex hormone binding globulins age dependence and interrelationship with steroid harmones. C-QU/MED (45)	64,010/-	Dr. M. Arsalan, Professor, Department of Biology, Quaid-i-Azam University, Islamabad.
ii)	Relationship between in-come distribion, food availability and nutritional status of people of Pakistan since independence. C-PCGP/MED (56).	67,400/-	Dr. Sirajul Haq Mahmood, Senior Chief, Health Planning Commission Govt. of Pakistan.
iii)	Neonatal Screening for Hypthroidis hypothyroidism and its relationship to mental retardation. P-AEMC/MED (58)	40,000/-	Dr. Farhat Zaheer, Senior Scientific Officer, Atomic Energy Medical Centre, Lahore.
iv)	Identification of biochemical errors causing brain damage and Neurologic disorders. S-DMC/MED (66)	2,51,800/-	Dr. Akhtar Ahmad, Professor of Neurology, Dow Medical College, Karachi.
v)	Ultra sound in obstetrics and Gynaecology. S-LMCH/MED (71)	3,48,400/-	Prof. Qamar Shah, Liaquat Medical College and Hospital, Hyderabad.
vi)	High Altitude medical research project-Incidence of Malarial parasites. P-PMI/MED (72)	40,500/-	Dr. M. Aslam Khan, Post Graduate Medical Institute, Human Genetics Department, Lahore.
vii)	High Altitude Mountain Sickness exploration and evaluative study. F-MH/MED (73)	37,400/-	Mr.Mohammad Ilyas, Cardiologist, Muhammadi Hospital Peshawar.
viii)	High Altitude Biomedical researc project P-PMI/MED (79)	2,66,600/-	Prof. Farrak A. Khan, Post-graduate Medical Institute, Lahore.

Annexure-III

INSTITUTIONAL SUPPORT

S.No.	Name of Institution	Grant Released
1.	Govt. College for Women, Faisalabad	Rs. 30,000/-
2.	Islamia University, Bahawalpur,	Rs. 57,000/-
3.	Post-graduate Medical Institute, Lahore	Rs.1,20.000/- Rs. 20,000/-
4.	University of the Punjab, Lahore (Institute of Chemistry and Department of Physics).	Rs.1,50,000/-
5.	H.E.J. Research Institute of Chemistry, University of Karachi, Karachi.	Rs.1,00,000/-
6.	University of Peshawar, (Department of Zoology).	Rs. 50,000/-
7.	University of the Punjab, Lahore (Department of Botany).	Rs. 40,000/-
8.	University College,Kotli (A.K.)	Rs. 75,000/-
9.	Quaid-i-Azam University, Islamabad	Rs. 25,000/-
10.	Khyber Medical College, Peshawar	Rs. 25,000/-
11.	National Science Council, Islamabad	Rs. 10,000/-
	Total:-	Rs.7,02,000/-

Annexure-IV

PSF GRANTS SANCTIONED TO THE SCIENTIFIC SOCIETIES AND LEARNED BODIES FOR THE ACHIEVEMENT OF THEIR OBJECTIVES YEAR 1981-82

S.No.	Name of Society	Grant in Rupees
1.	Pakistan Association for the Advancement of Sciences.	Rs. 50,000/-
2.	Pakistan Association of Scientists and Scientific Professions.	Rs. 50,000/-
3.	Scientific Society of Pakistan	Rs. 50,000/-
4.	Pakistan Academy of Sciences.	Rs. 50,000/-
5.	Institution of Engineers, Pakistan	Rs. 40,000/-
6.	Pakistan Engineering Congress	Rs. 30,000/-
7.	Sind Science Society	Rs. 30,000/-
8.	Lahore Mental Health Association	Rs. 25,000/-
9.	Zoological Society of Pakistan	Rs. 25,000/-
10.	Institution of Electrical Engineers, Pakistan	Rs. 25,000/-
11.	Botanical Society of Pakistan	Rs. 20,000/-
12.	Biological Society of Pakistan	Rs. 20,000/-
13.	Pakistan Medical Association	Rs. 20,000/-
14.	Pakistan Institute of Metallurgical Engineers.	Rs. 20,000/-
15.	Institute of Chemical Engineers, Pakistan	Rs. 15,000/-
16.	Soil Science Society of Pakistan	Rs. 10,000/-
17.	Pakistan Society of Biochemists	Rs. 10,000/-
18.	Solar Energy Society of Pakistan	Rs. 10,000/-
19.	Energy Society of Pakistan	Rs. 10,000/-
20.	Chemical Society of Pakistan	Rs. 10,000/-
21.	Pakistan Association for the Advancement of Agricultural Sciences.	Rs. 10,000/-

Annexure-V

PSF GRANT SANCTIONED TO VARIOUS AGENCIES FOR THEIR PUBLICATION PROGRAMME FOR THE YEAR 1981-82.

S.No.	Agency	Publication	Grant in Rupees
1.	Pakistan Forest Institue, Peshawar	Pakistan Journal of Forestry.	Rs. 15,000/-
2.	Zoological Society of Pakistan	Pakistan Journal of Zoology.	Rs. 20,000/-
3.	Botanical Society of Pakistan	Pakistan Journal of Botany	Rs. 20,000/-
4.	Pakistan Society of Biochemists	Pakistan Journal of Biochemistry	Rs. 15,000/-
5.	Biological Society of Pakistan	Biologia	Rs. 20,000/-
6.	Pakistan Association for the Advancement of Science	i) Pakistan Journal of Science ii) Pakistan Journal of Scientific & Industrial Research.	Rs. 40,000/-
7.	Faculty of Veterinary Science, University of Agriculture, Faisalabad.	Pakistan Veterinary Journal	Rs. 10,000/-
8.	Scientific Society of Pakistan	i) Science Bachoon-ke-Liye ii) Science Magazine	Rs. 30,000/-
9.	Pakistan Academy of Sciences	Monographs etc.	Rs. 10,000/-
10.	Chemical Society of Pakistan	Journal of the Chemical Society of Pakistan	Rs. 20,000/-
11.	Pakistan Institute of Chemical Engineers	Journal of the Pakistan Institute of Chemical Engineers	Rs. 20,000/
12.	Society for the Advancement of Agricultural	Pakistan Journal of Agricultural Sciences.	Rs. 5,000/-

Annexure-VI

GRANTS SANCTIONED FOR ORGANISING SCIENCE CONFERENCE/SYMPOSIA/SEMINAR

S.No.	Agency	Object	Amount
1.	Boards of Intermediate & Secondary Education	Summer School for Talented Student.	Rs.15,000/-
2.	Institute of Engineers, Pakistan	Role of scientists & Engineers in the Improvement of productivity.	Rs.10,000/-
3.	Lahore Mental Health Association,Fountain House, Lahore	International Seminar on Rehabilation of the mentally ill.	Rs.25,000/-
4.	Zoological Society of Pakistan	2nd All Pakistan Zoological Congress.	Rs.20,000/-
5.	Botanical Society of Pakistan	Ist All Pakistan Meeting of Plant Scientists.	Rs.20,000/-
6.	Pakistan Association of Scientists & Scientific Professions.	28th Annual All Pakistan Science Conference.	Rs.55,000/-
		Total:-	Rs.1,40,000/-

Annexure-VII

TRAVEL GRANTS FOR VISIT ABROAD

S.No.	Name & Address	Institution to be visited	Purpose of visit	Amount sanctioned
1.	Dr.Abdul Majeed, Associate Professor, Department of Mathematics, University of Punjab, New Campus, Lahore.	Carelton University Ottawa, Canada.	To avail post Doctorl fellowship	as Rs.22,296/-
2.	Mr.S.A.Raza Jafree, Assistant Professor, Deptt.of Earth Science, Quaid-i-Azam University, Islamabad.	U.K.London	To parti- in Confer- ence on Kar- akorum project	Rs.19,040/-
3.	Dr.Col.Ashfaq Ahmad, Professor of Community Medicine, Army Medical College, Rawalpindi.	San Diego, California, U.S.A.	To attend the XII Inter- national Congress of Nutrition.	Rs.3,840/-
4.	Dr.M.Saleem Akhtar Professor of Obsterics and Gynaecology, Post-graduate Medical Institute, Lahore.	Australia	To attend VIII Asian Congress of Obstetrics & & Gynaecology.	Rs.7,520/-
5.	Mr.Ghulam Saeed Khan Deputy Director (Research),Soil Survey of Pakistan, Lahore-18.	New Delhi, India	To attend 12th Inter- national Congress of Soil Sciences.	Rs.4,703/-
6.	Col.Manzoor Ahmad Deputy Commandant, Armed Forces Institute of Pathology, Rawalpindi.	Hong Kong	To attend The International Association for the study of liver and Asian Pacific	Rs.13,902/-

			Association for the study of liver.
7.	Dr. M. Arsalan, Professor, Deptt. of Biological Sciences, Quaid-i-Azam University, Islamabad.	Hong Kong	To attend Rs.14,252/- the 9th International Symposium on Comparative Endocrinology.
8.	Dr.A.R.Memon, Institute of Chemistry University of Sind,	New Castle	Training Rs.16,980/- facilities in clinical Biochemistry
9.	Mr.A.Sattar Sikandar, Chairman, Department of City & Regional Planning, University of Engineering & Technology, Lahore-31,	Madras, India	To attend Rs.8,995/- the 8th WEDC Conference of Slum Improvement on water and waste Engineering at Asia & India.
10.	Dr.F.H.Shah, Chief Scientific Officer, Food Technology & Fermentation Division, PCSIR Laboratories, Lahore.	India	To attend Rs.9,300/- the first AFST International Food Conference.
11.	Dr.Zafar H.Zaidi, HEJ Research Institute of Chemistry, University of Karachi, Karachi.	Annherst Massachusetts	To parti- Rs.16,847/- cipate in the 28th IUPAC Symposium.
12.	Mr.Mohammad Alim Mian, Director, Soil Survey of Pakistan, Multan Road, Lahore.	New Delhi India	To attend Rs.4,636/- 12th International Congress on Soil Sciences.
13.	Prof. M.Ata-ur-Rehman Deptt.of Biochemistry, Jinnah Post-Graduate, Medical Centre, Karachi-35.	Australia	To attend Rs.24,904/- 12th International Congress of Biochemistry.

14.	Dr. Mohammad Ikram Khan, Chairman, Mechnical Engineering Department, University of Engineering and Technology Lahore.	Tokyo-Japan	To attend Rs.25,840/- the International Workshop on Solar Green House, Architecture and Agriculture, and 10th Symposium on flame visulization.
15.	Dr. Saleh Memon, Prof. & Head of Deptt. of Medicine, Dow Medical College, Karachi.	Washington D.C.	To attend Rs.11,160/- the Pan American Congress of Rheumatology.
16.	Dr. Main Mohammad Aslam, Associate Professor, Deptt. of Soil Sciences, University of Agricultre, Faisalabad.	U.K.	To attend Rs.17,220/- the 9th International Plant Nutrition colloqium.
17.	Dr. M. Saeed Akhtar Assistant Professor, Department of Zoology, University of Punjab, Lahore.	Boulder, Colarado U.S.A	To attend Rs.8,556/- the 9th International Congress, International Union for the study of Social Insects.
18.	Mr. Faiz-ur-Rehman Scientific Officer, PAEC Atomic Energy Medical Centre, Lahore.	Flordia, U.S.A.	To attend Rs.29,908/- the 29th meeting of of Nuclear medicine.

Annexure-VIII

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 contents

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

II. Exchange visits

In each year commencing lst April, the Sides will organize and finance visits in each direction by research scientists of post-doctoral or equivalent status in pure and applied fields in two categoreis:-

(a) Study visits:- Usually for short period 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) Fellowship:- 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.

III. 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 that particular scientists or subject should be considered by the sending Side, when the work to be undertaken in the

in the host country relates to a joint project, or will be especially valuable in the furtherance of scientific collaboration.

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

Nomination are to be forwarded to the host Side in sufficient time for at least three months notice to be given in each case. No 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.

IV. Attendance at meetings

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

V. 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.

VI. Medical treatment

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

VII. Validity of Agreement

This Memorandum of Understanding shall enter into force upon signature and shall remain in force for a period of five years theeafter, 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 witiness hereof, the undersigned, being düly authorized, have signed this Memorandum of Understanding.

Done at London, this 15th day of September, 1981

Sd/-	Sd/-
(DR. M. D. SHAMI)	(SIR ARNOLD BURGEN)
PAKISTAN SCIENCE FOUNDATION	ROYAL SOCIETY OF LONDON

THE ROYAL SOCIETY

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

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

Study Visits

Accommodation

The host side will rserve 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 expnses (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 re-imbursed 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

Accommpanying 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 requested,

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	For the Pakistan Science Foundation
Signed Sd/- Sir Arnold Burgen	Singed Sd/- (Dr. M. D. Shami
(Title) Vice President	(Title) Chairman