



Pakistan
Science
Foundation
ANNUAL REPORT
1982
83



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PAKISTAN SCIENCE FOUNDATION

Almarkaz F7/2
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LETTER OF TRANSMITTAL

Islamabad

Dear Mr. Secretary

I have the honour to enclose herewith Tenth Annual Report of the Pakistan Science Foundation for the Fiscal Year 1982-83, 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 and Technology,
Government of Pakistan,
Islamabad.

PAKISTAN SCIENCE FOUNDATION

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Dr. G. M. Khattak, Vice Chancellor, University of Agriculture Peshawar.

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Dr. A. Q. Ansari, Vice Chacellor, Sind Agriculture University Tandojam.

Dr. Ishfaq Ahmed, Member (Technical), Pakistan Atomic Energy Commission, Islamabad.

Mr. Abdul Raziq, Secretary (Irrigation), Government of Baluchistan, Quetta.

Dr. Tahir Hussain, Whole-time Member, University Grants Commission, Islamabad.

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LIST OF ABBREVIATIONS

Province

B	Baluchistan
C	Centre
F	Frontier
P	Punjab
S	Sind

Sponsoring Institutions

AC	Agricultural College
AU	Agricultural University
EU	Engineering University
QU	Quaid-i-Azam University
KU	Karachi University
HG	Government College, Haripur
PU	Peshawar University/Punjab University
SU	Sind University
KMC	Khyber Medical College
NHL	National Health Laboratories
CSIR	Council of Scientific 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 and Technology in the forward march of the nation of self reliance in solving the hard pressed needs in developing agriculture, engineering, medicine and energy resources.

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 upto date literature, non availability of most modern and sophisticated scientific equipment/apparatus, and the lack of interaction with the scientific community internationally. Non-appreciation by 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, an organization with sufficient authority and financial resources, such as the Pakistan Science Foundation 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-I) 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 of national significance relevant to the socio-economic development of the country;
 - iii) the utilization of the results of scientific and technological research, including pilot plant studies, to prove the technical and economic feasibility of processes found to be promising on a laboratory scale;
 - iv) the establishment of science centres, clubs, museums, herbaria and planetaria;

- v) the development of learned bodies, scientific societies, associations and academies engaged in spreading the cause of scientific knowledge in general or in the pursuit of a specific 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 efforts 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 progress of the work done by the Pakistan Science Foundation during the year 1982-83 under the various functions entrusted to it is summarised below:-

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

i) Construction of PASTIC Permanent Building

Shutters and frames of windows and doors made in wood were fixed and glass panes in the windows were fitted on all the three floors and basement during the period under report. Mosaic flooring, cutting, polishing etc. was completed. Sanitary fittings were also completed. Electric wiring of varying voltages and fixing of electric panels, switch boards, fans, tubes lights etc. were completed in the whole building including basement area to meet specific requirements of electrical and electronic machines of Reprography Unit. Pipe connections for water and sewerage were fitted. Doors and windows were fixed and painted on all the three floors and the basement. One underground water reservoir and four overhead tanks were constructed. Vinyl tiles were laid on the library floor. Temporary electric connection was provided by WAPDA. Facing work of the building was continued. White washing and painting of the building was completed. Wooden book shelves measuring 10,000 ft. were made for the library during the period reviewed.

ii) Document Procurement and Supply Service

Five thousand and fourteen (5,014) fresh documents requests were received from various S&T research organizations, industries, universities, other academic institutions, entrepreneurs and individual working scientists during the year under report. The above orders were processed and placed with the internal and overseas information supplying agencies and cooperating libraries. Out of the above intake, four thousand four hundred and fifty one (4,451) orders was the outgo which consisted of periodical articles, NTIS reports, patent specifications, translations, bibliographies, manuals, monographs directories etc. The supplied information contained forty eight thousand eight hundred and seventy nine (48,879) pages of photocopies and one thousand three hundred and twelve (1,312) pages of microfilms respectively. In addition, two lac fifty four thousand and six hundred (254,600) printed impressions were supplied against fourteen different jobs of printing. Twenty two thousand and ninety eight pages were duplicated on paper copier against 433 assorted jobs.

iii) Translation Service

Translation of thirteen (13) S&T papers were rendered from foreign languages including Spanish, German, Russian, Portuguese and Italian into English and supplied to the clients working in different R&D organizations in Pakistan. The translated texts comprising of 75 pages contained 22,500 words in total.

iv) Pakistan Science Abstracts

Three hundred and thirty (330) papers from the domestic S&T journals were scanned and abstracted for publication of volume No. 19-20, Year 1979-80 of the abstracting journal of PASTIC i.e. Pakistan Science Abstracts (PSA).

v) NTIS Information Service

NTIS AMTID - 5 and AMTID -6 Catalogues featuring metal working foundation, forest and paper industries, wood wastes and paper recycling etc. were distributed to relevant R&D institutions during the period under review in order to keep the concerned quarters informed of the latest development occurring in their fields of interests.

vi) Computer Programming for S&T Data

Three hundred and fifty (350) NASDATA input forms were filled up with bibliographic details of library books and journals during the period under review. Accession numbers, classification numbers and book codes were added to 225 data sheets. The computer input prepared in PASTIC was passed on to the computer centre of the Quaid-i-Azam University for programme listing.

vii) Patent Information Service

Reprints of sixty four (64) patent specifications were catered to the requesters during the year under review. In addition, twenty eight (28) patent indexes on pigments, grinding, polishing of glass components, detergents, textile dyeing and printing, welding, pesticides, cements, paints, harvesting, insecticides, manufacture of phenols, thermoplastic materials etc. were forwarded to entrepreneurs, technologists and technocrats.

viii) Bibliographic Service

Thirteen (13) bibliographies were compiled on specific topics which contained 330 references in total. These topics include inter alia Mint-Mentha, Salinity effects on growth and oil contents of

sun flower, analgesic Nephropathy and Hepatotoxicity, NPK fertilization on maize and sorghum, effects of corrosion on Nuclear Power Plants, Petroleum, Sulphuric Acid, papers and fertilizer industries, grinding and polishing of glass etc. Apart from this three bibliographies on the subjects of topical importance of Wind power, Biogas and Solar energy were obtained from overseas sources and supplied to the prospective users. The sum of the references contained in the three bibliographies was 2,918.

ix) National Science Reference Library

Six hundred and nineteen (619) non-book material items including primary & secondary S&T journals, bibliographies and indexes were received for the library during the year under report. Apart from this, stock taking of the library was started. Sixty six (66) volumes of basic reference books including technical dictionaries were sorted out and their full bibliographic entries were made on the slips. Bibliographic information of 85 back volumes of Indian Journals was entered in the Cardex. Nine hundred and twenty two (922) back volumes of the periodicals were arranged titlewise in chronological order. 383 books and 140 dictionaries were classified. Reading and reference services were routinely carried out.

x) Inventory of Pakistani Literature

More than 300 local institutions were requested to supply copies of the S&T publications inclusive of reports etc. published by them. This effort was made with a view to preparing an up-to-date inventory of Pakistani literature.

xi) Shifting of Reprographic Equipment and Office Records from PASTIC Sub-Centre, Karachi to PASTIC National Centre, Islamabad

Reprographic equipment and office records from the Sub-Centre Karachi was shifted to the newly constructed building of PASTIC at the Quaid-i-Azam University Campus, Islamabad. Air-conditioner of 30 ton capacity was also shifted for reinstallation in the reprographic Unit in the basement of the new building. The equipment and office records etc. were unpacked and placed in the basement and on the ground floor.

xii) Shifting of National Centre

The offices and the library of PASTIC National Centre were moved to the newly constructed premises at the Quaid-i-Azam University Campus in May 1983 from the rented commercial flats of P-13 Al-Markaz, F-7/2, Islamabad.

xiii) Conference on NTIS Services

A paper consisting of 6 pages was contributed by PASTIC/PSF in the conference sponsored by NTIS U.S.A. at Singapore in November, 1982. Scope of NTIS service in Pakistan and utilization of NTIS by Pakistani scientists was discussed in the paper "Certain ways and means were also suggested for widening the use of NTIS information Services in Pakistan.

xiv) Participation in RCTT Seminar held at Manila and Seoul

Dr. A. R. Mohajir, Project Director, PASTIC attended the Roving Seminar sponsored by RCTT Dissemination of information on Technology Transfer at Manila and Seoul from 21 February to 7 March, 1983. A paper on the given topic was contributed by him in the seminar.

xv) Seminar on S&T Information in Quetta Baluchistan

PASTIC's sixth seminar of the series on the Strategy and Impact of S&T Information on Socio-economic development of Pakistan was held in the auditorium of the University of Baluchistan, Quetta. The Vice Chancellor of the University, Brig. Agha Akbar Shah in his Inaugural Address underscored the importance of information services in the R&D efforts and commended the catalytic role of PASTIC in acceleration of scientific, technological and industrial pace in the country. Dr. M.D. Shami, Chairman, Pakistan Science Foundation in his Welcome Address highlighted the benefits that would accrue from the Seminar for the participants particularly of the Baluchistan province. Twelve papers were contributed by the academics, scientists, information scientists and librarians in the two day seminar.

xvi) WIPO Experts visited PASTIC

Two experts, Mr. Anna R. Schileusener and Dr. Lander A Feiler from the World Intellectual Property Organization (WIPO) visited PASTIC National Centre on 22 November, 1982 and discussed with the Project Director, PASTIC, matters concerning the possibility of establishing a Regional Patent Information Centre in Pakistan. The foreign experts were apprised about the patent information service being rendered by PASTIC in addition to its normal information activities.

xvii) Mr. John Gray's visit to PASTIC

Mr. J. Gray, Special Adviser on Information Services, British

Department of Education and Science visited PASTIC from 29 December 1982 to 13 January 1983. Present state of services and future development of PASTIC was discussed in a series of meetings in PASTIC. A few scientific and academic institutions were also visited by him during his stay in Pakistan. He furnished a report titled 'Future development of PASTIC.' The report mainly dealt with (a) improvement of existing information services (b) marketing of services (c) development of new services (d) new technology (e) promotion, liaison coordination and (f) manpower, education and training. A meeting between the Chairman, PSF and the local Representative of the British Council was held on 30.3.1983 in connection with the report of Mr. Gray.

II. RESEARCH SUPPORT

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

The Foundation carries out its statutory responsibility for the support of 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) Organization of Integrated Research Programmes.
 - (d) 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 promotion of basic and fundamental research, having relevance to the socio-economic needs of the country.

During the period under report, 43 projects costing Rs.9.992 million were received by the Foundation. And 45 project proposals which had been at the various stages of their processing, were carried over from the previous year. Thus, in all, 88 proposals remained under active consideration of the Foundation during 1982-83. These

**PASTIC QUANTITATIVE DATA TABLE OF INFORMATION SERVICES
FOR THE PERIOD FROM JULY 1982 – JUNE 1983**

Orders Received	Orders Supplied	Photo- copy pages supplied	Biblio- graphy Referen- ce supplied	Translat- ion. No. of trans- lated words	No.of papers abstract- ed	No.of specif- cation supplied	Printing No. of impr- ession printed	Library S&T Journal acquired etc.	Microfilm pages supplied	Computer input forms completed
5,014	4,451	48,879	2,528	22,500	330	64	2,54,600	619	1,312	350

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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 year, only 20 projects could, however be sanctioned at an estimated cost of Rs.3.720 million.

Discipline-wise distribution of grants made by the Foundation during the past eight years, is shown in Table-1. (see page 10)

RESEARCH PROJECTS*

Summaries of the research proposals sanctioned during the year 1982-83 are given below:-

AGRICULTURAL SCIENCES

P-CSIR/AGR (67)

Title: *Utilization of indigenous Resources for introduction of Game Birds (Japanese Quails) Breeding in Pakistan.*

Pakistan has variety of wild birds i.e., Chukoors, Partridge, Quails and Pheasants in wide range of plains, hills and forests, the most suitable habitat for breeding these game birds. The population of these birds is high when patch farming operations are prevalent. The increase in population and change in farming pattern destroyed the natural habitat. The indiscriminate hunting and sprays of insecticides and herbicides also decrease the growth of birds population. The birds were thus forced to thrive on small uncultivable lands and scare vegetation. The Government, in order to rehabilitate the birds population, imported parent stocks and provided to livestock Department but due to lack of adequate training, proper feed and technical know how the desired results could not be achieved.

The project is aimed at (i) developing game bird farming, husbandry and breeding of partridges, chukoors and quails and (ii) providing breeding flock, feeds and training to farmers for commercial farming.

The study would help production of cheap and nutritious bird feeds and rearing of game birds on profitable lines.

*For names of the Principal Investigator and sponsoring Institutions, refer Annexure-II.

TABLE - 1
SCIENTIFIC RESEARCH PROJECTS SANCTIONED DISCIPLINE-
WISE DURING JULY, 1973 TO JUNE 1983

DISCIPLINE	1973-79		1979-80		1980-81		1981-82		1982-83		1973-83	
	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	No. of scheme	Amount sanctioned
Agricultural Sciences	20	3.842	2	0.253	1	0.024	1	0.244	2	0.368	26	4.731
Biological Sciences	41	5.297	8	0.747	1	0.147	4	0.891	5	0.869	59	7.951
Chemical Sciences	47	6.379	10	0.727	7	0.631	6	0.681	8	1.173	78	9.591
Earth Sciences	11	1.158	1	0.054	-	-	-	-	1	0.186	13	1.398
Engineering Sciences	4	0.389	-	-	1	.071	-	-	2	0.620	7	1.080
Environmental Sciences	10	1.180	3	0.274	-	-	1	0.100	-	-	14	1.554
Mathematical Sciences	3	0.214	-	-	1	.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	.096	2	0.503	20	3.654
Total:-	171	22.646	29	2.575	20	1.989	24	3.822	20	3.719	264	34.751

Title: *Development of Commercial Cotton Hybrid*

The yield of cotton in Pakistan is far below than that in the cotton growing advanced countries of the world. The improvements being made are very slow and in consistant with the developing needs of our country's economy. Notwithstanding the earnest efforts through conventional breeding, improvement in cotton yield and its quality, has not been enough to bring us to the level of the developed countries. Some methodology other than the conventional needs to be developed.

The project envisages to boost up cotton production and to improve the quality by exploiting the well known phenomenon of heterosis manifested by FI hybrids derived by crossing the parents belonging to different races and species e.g. Egyptio - American hybrids.

The investigations would result in production of a commercial cotton hybrid with 25-50% increase in yield with extra long staple having better characteristics.

BIOLOGICAL SCIENCES

S-SU/BIO (115)

Title: *Study on Taxonomy of the Grasshoppers of Sind*

The grasshoppers are of considerable economic importance to crops and rangeland. It is essential to have a detailed knowledge of their value as pests, so that diagnosis of an economic problem can be properly made.

The project envisages a study of the taxonomy, ecology and economic importance of grasshoppers of Sind province.

The result of the study will provide an authentic identification of grasshoppers attacking crops and range lands of Sind.

S-KU/BIO (116)

Title: *Chemotaxonomic Studies in Angiosperms (from Pakistan) with reference to Phenolics.*

Phytochemistry, particularly Phenolics are important as taxonomic markers because of their variability, wide distribution, stability, ease of detection and relatively known inheritance. These

comorits have direct multipurpose functional roles such as improving plants of horticulture and pharmaceutical interest, fodder plants, fruit processing and other industries. Agricultural crops are improved by introducing disease resistance varieties which are associated with high level of phenolic compounds. Species specific Phenolics would provide a good basis to be used for plant systematics.

The project aims to study the species differentiation on the basis of species/specific Phenols and to provide a broad Phenolic spectrum to be used in several applied and pure sciences for different purposes.

The result of the study will provide species differentiation for future use of plants in Pakistan. This study is a preliminary step towards specification of phenolrich taxa, to be used in future taxonomic work.

P-PU/BIO (117)

Title: *Biology of Bellamaya bengalensis (Larmack) with special reference to its reaction to other molluses and digenetic trematode parasites*

Digenetic trematodes are parasitic worms of considerable academic and economic importance. An estimated 200 million people in different parts of the world suffer from Schistosomiasis alone, thus causing serious damage to the health and prosperity of human beings. Moreover cattle, sheeps fish and other domestic animals are also definite hosts of these parasites and result into significant loss in their production.

The snails which serve as intermediate hosts, form an essential and easily vulnerable link in transmission of trematode infections. Therefore study of biology of the concerned snails becomes essential in the control of the trematode infection.

The project aims at studying the biology of a fresh water mollusc, Bellamaya hengalensis, its interaction with other molluse species, its possible role in biological control of important snail species and its preventive mechanisms towards susceptibility to digenetic trematodes.

The result of these investigations would help controlling the out break of parasitic infestation in human being and livestock.

S-AU/BIO (122)

Title: *Studies on Incidence, Taxonomy and Seasonal variation of etco and endo parasite of Wild Birds in Sind.*

The wild birds play an important role in the spread of epizootic in domestic life including birds and animals. These birds also harbour certain internal and external parasites, which can likely turn harmful to domestic population of poultry and even human beings. The ecto parasites of birds are regarded as playing vital role in the transmission of various pathogens harmful to domestic life.

The present study envisages to study the (i) incidence of ecto and endo parasites of different wild birds, (ii) seasonal variations and magnitude of infection and (iii) host specificity of ecto Parasites in domestic poultry with possible role in the epizootiology.

The study would indicate the clear records on the incidence of ecto and endo parasites in wild as well as in domestic life.

P-AU/BIO (126)

Title: *Preparation of Book on Medicinal Plants of Pakistan*

Medicinal plants and their extracts have been used by mankind for healing and treatment of diseases since prehistoric times. Even in the present scientific age plants play great role in the drug research and disease control. The basic structures of most of the synthetic pharmaceuticals have been derived from herbal extracts which after suitably amended and improved are presented in the market as new pharmaceuticals.

There is, a dire need to propagate the knowledge about medicinal plants through literature and laboratory research.

The proposal aims to prepare a book on medicinal plants of Pakistan which can be translated later into Urdu for use as text in Unani medicine schools and reference hard book for researchers, apothecaries and Pharmacists.

CHEMICAL SCIENCES

P-CSIR/Chem (107)

Title: *Pilot Plant Production of Butanol by Fermentation*

Agriculture by-products like molasses are available to the tune of million tons per annum. Only a fraction of molasses is used in the country for alcohol production, bakers yeast and in foundries for moulding. The rest of molasses, however is exported at throw-away prices while finished goods are imported at colossal expenses.

Butanol and its derivatives Butyl acetate are imported in the country for paint industry and for the recovery of penicillin from fermented broth and involve substantial amount of foreign exchange. Pakistan is an agricultural country and sugar industry is very well established producing molasses (cane and beet).

The aim of the project is to develop technology for the production of butanol by fermentation process using molasses as raw material.

The process developed by the project team would therefore be of substantial economic importance.

F-PU/Chem (135)

Title: *A study of Acetylcholinesterase in Erythrocytes "A Kinetic Approach for Accurate Clinical Diagnosis."*

The erythrocyte acetylcholinesterase is an extremely oriented membrane bound enzyme whose kinetic properties alter under clinically abnormal conditions for instance low levels of the enzyme are found in malnutrition, several types of anaemias erythrocytosis, acute leukemia etc.

The study aims to determine precise estimates of the constants (K_m, V_m) of the erythrocyte acetylcholinesterase in each type of known haematological disorder. The abnormalities will include anaemias, and cancer cases that arise from perturbations in bone marrow and other erythrocyte forming centers.

The work will prove to be very useful in providing a rapid and precise kinetic procedure for accurate diagnosis of the haematological abnormalities.

C-QU/Chem (137)

Title: *Polymerization and Electron Transfer process Studies on substituted Ethylenes.*

Polymers are of almost innumerable types and their uses are enormous. In country, generally, those polymeric materials which are getting out dated in the western countries are being manufactured. The better quality polymers are imported. No research is being carried out on polymers. Phenomenon of polymerization particularly ionic polymerization can be understood (and hence controlled) with the understanding of solution chemistry and electron

transfer process which include ion pairing, homogenous and heterogenous electron transfer (e.g. single step and multistep electron transfer), solvation free energies etc.

The project aims to study electrochemical as well as optical properties of various salts of substituted ethylenes (triphenyl and tetraphenylethylenes, cis, trans- stilberes, 1,2-diphenyl cyclopropane, 1,2-disphenyl cycle butene and pyridine substituted ethylene) to understand the phenomena of ion pairing and disproportionation. Also since the methods of studying the protonation of reactive species, the monanion radical and dianion are available, kinetics of protonation of these reactive species will be studied.

C-QU/Chem (138)

Title: *Pollution control studies on Water in the Public Utility and Industry in Pakistan.*

The pollution of the environment and in particular of water resources has become a major subject of investigation in all industrialized countries. The effects of pollution caused by water on the environment and on the man himself are very serious.

The project aims to identify the chemical pollutants in treated/un-treated surface and ground water samples in public utility and to determine the spatial and temporal concentration distribution of these pollutants.

The study will help to develop a methodology for necessary chemical treatment of effluents of food, tobacco, textile, leather, glass, cement and chemical industries and to reutilize the wastes, to produce good quality water.

P-CSIR/Chem (140)

Title: *Studies for Industrial Exploitation of Nagar Parker China Clay*

China Clay consists of mainly Kaolinite obtained from Kaolinized grants. China clay like quartz and feldspar is an essential raw material required for the manufacture of all products of ceramic industry and is available in our country. The import of good china clay is increasing every day to fulfill the requirements of not only our ceramic industry but also for the chemical, paper, and rubber industries.

The present work aims to study the conditions for industrial exploitation of Nagar Parker China Clay and to provide the basic

data and information necessary for such exploitation.

The completion of this project shall save a lot of foreign exchange, which can be utilized on other national development programmes. It will increase the gross national production with the result that there would be expansion in the industrial fields and more job opportunities for our skilled and semi-skilled labour force.

EARTH SCIENCES

P-PU/Earth (24/1)

Title: *Geochemistry and minerology of sardhai formation and related rocks of the salt range, Punjab*

The present proposal is an extension of the project conducted under the same title. Results have not only confirmed the presence of copper minerals but have yielded important unexpected discoveries of tin and tungsten. Discovery of tin is the first in the entire country.

At present there is a need to discover new fields to explore materials like Tin and Tungsten of economic importance. The project aims at in depth study of Tin and Tungsten mineralisation in addition to the associated copper minerals. Attention will also be concentrated on the metallic minerals including extensive field work as well as detailed Lab. work to reach a suitable scientific and technical level that may provide a development work.

The completion of this study shall save a lot of foreign exchange used for import of Tin and Tungsten and help to discover more material of economic importance. It will also open possibilities of research activities in the other rock formation of the salt range.

ENGINEERING SCIENCES

P-EU/ENG (17)

Title: *Ground water Management Model of Scarp-II*

Ground water management of scarp-II is very important practical problem. Pakistan faces major problems of water logging and salinity. Considerable amount of work on analogue models during the planning of Scarp-II has been done while very little work has been done on digital modelling in Pakistan.

The project aims to conduct research study on ground water management model of Scarp-II by collecting necessary field data available in the fields of various agencies; preparing a computer programme and feeding the data into the computer to determine ground water behaviour under various operating conditions.

The study when completed shall establish a criteria to store water under-ground against prolonged drought and ensure the ability of ground water system to deliver water during drought in low flow season.

MEDICAL SCIENCES

P-PMI/MED (86)

Title: *Modified Trabeculectomy Aspiration for Chronic Simple Glaucoma.*

Glaucoma is second major cause of blindness in the world. The blindness is due to raised intraocular pressure in the eye producing pressure on the optic nerve and damaging its fibres. The blindness produced by the glaucoma is irreversable. Treatment is both medical and surgical. Medical treatment includes use of systemic Diamox and topical use of drugs in the eye for the rest of the patient's life.

The scheme envisages to evaluate the best methods of chronic simple Glaucoma Surgery, between the traditional trabeculectomy and modified trabeculotomy. 200 chronic simple glaucoma will be induced in the study. Record of visual acuity interocular tension, visual field, disc changes and gonoscopic view will be done at regular intervals and their results in both traditional and modified trabeculotomy operation will be compared.

P-SGR/MED (87)

Title: *Comparative study of Aspiration Cytology and Tru-Cut Needle Biospy in the diagnostic Evaluation of Breast Masses.*

Breast Cancer is one of the leading causes of death in woman of 35-55 years. In spite of diagnostic and therapeutic advances, early detection and treatment of breast cancers remains a challenge. Whenever a woman presents with a breast lump, the question a surgeon poses to himself in whether the lump is malignant or benign. A pretty confident assessment has to be made on the basis of history, clinical examination and mammography for subjecting the patient

to an open excision biopsy. The decision to perform an Open Breast Biopsy in patients with palpable lumps at present is mainly a Clinical one.

The project envisages to (i) define the role of aspiration cytology and Tru-Cut needle Biopsy in the management of breast lesion, (ii) reduce the number of unnecessary operations of excisional biopsy and (iii) study the incidence of Carcinoma in patients with breast lumps. The investigation would provide valuable clinical and Laboratory aspects of breast diseases in this area.

C-QU/MED (88)

Title: *Use of Carcino Embryonic Antigen for Cancer Diagnosis*

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

The project aims at isolating and purifying C.E.A. form tumors such as Breast tumour, Lung tumour and Stomach tumour and determining as to whether the same antigen is present in all of these tissues. Attempts to isolate and identify unknown proteins which could be used as a marker and not reported in Literature shall also be undertaken. A radio-immunoassay protocol of the isolated antigen will be developed and later used to measure CEA in serum of healthy controls, known patients and group in population. From the values obtained from the healthy controls and known patients, prediction about cancer probability will be made in unknown cases. This will be crosschecked with an imported RIA kit.

B-BU/Med (89)

Title: *Biochemistry of Gall bladder Mucins Glyoprotein*

One third of the world adult population and a large number in Pakistan is suffering from the cholesterol, gallstones resulting in both, medical and economic complications. A limited research has been conducted in structural characterization and biochemical implication of gallbladder secretion in mammalian systems and practical conclusions have been reached on the role of glycoproteins in the regulation of gallstone formation. Gallbladder mucin consists of glycoproteins which are considered to be the contributing factors for the formation of gallstones.

The project envisages isolation purification and structural elucidation of human and bovine gallbladder mucus glycoproteins of normal and pathological gallbladders and studying the biosynthetic variations in both the cases. The structure-functions relationship of glycoproteins in normal and pathological states will be characterized in order to understand the physiological roles played by these macromolecules.

It is hoped that this investigation, with the help of explant culture, will lead to the control of glycoprotein biosynthesis. In addition, examination of inhibition of glycoprotein biosynthesis by analgesics in explant culture will provide a new means to inhibit gallstone formation.

B-BU/MED (93)

Title: *Biochemistry of Normal, Asthmatic and Bronchitic Lung Mucus.*

Pulmonary diseases (chronic bronchitis, asthma Bronchiectasis and lung cancer) are of common prevalence in Pakistan. Chemistry, biochemistry and structure of macromolecules involved in the regulation of these diseases have not been defined and require detailed investigations. A variety of human diseases have been described in which copious amounts of mucus are produced and retained in the submucosal glands, bronchi, bronchioles and alveoli. Excessive secretion of mucus glycoproteins critically influences the morbidity and mortality of patients with chronic obstructive diseases. Role in normal lung and serious involvement in pathological states, the progress in the chemistry and biochemistry of glycoproteins have been hampered owing to the minute quantities of normal human secretion. It is plausible to obtain sufficient quantities of normal and pathological samples locally for these studies.

The specific objective of this proposal is to characterize the chemical structure of the bronchial glycoproteins of normal humans and their pathological counterparts i.e. chronic bronchitic and asthmatic, in order to co-relate the chemical structure with physiological functions. The characterization of molecular variations (chemical structure) in the normal and Pathological states will permit better understanding, biochemical regulation and ultimately control of the pulmonary disease.

PHYSICAL SCIENCES

F-FU/PHYS (11/2)

Title: *High Energy Phenomenology*

The present proposal is an extension of the project conducted under the same title.

The study yielded interesting results which have since been published in the form of research papers in international journals and local journals of repute.

The present scheme aims at using the most recent experimental data for differential and total cross section, polarisation and density matrix elements, and the ratio of the real imaginary parts of the forward scattering amplitude.

It is hoped that the investigations in this field will lead to useful additions to the knowledge regarding the nature of elementary particles.

P-PU/PHYS (40)

Title: *Fabrication and characterization of MIS and Thin Film Solar Cells.*

The solar cell research has recently expanded due to rise in cost of conventional fuel. The solar cell is an attractive means of generating electricity as it does not cause pollution and does not have any moving parts.

The project aims to initiate research in the solar cell technology so as to increase the device efficiency and or to develop devices having a lower material cost. It is proposed to fabricate the MIS and thin film solar cells and to investigate their properties. Attempts shall also be made to correlate between their electrical and structural properties.

The project is of applied nature and technologically important. It will result in other useful measurements on technically important materials like photoconduction. This project is expected to train a few persons capable of rendering service in Solar Energy Technology.

(B) *Institutional Support*

Pakistan Science Foundation assists the Universities in the provision of equipment, chemical, 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 capacity, selected research centres and units.

During the current year an amount of Rs.11,22,000/- was sanctioned to various Universities/R&D organisation for the purpose indicated above (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 utilise the results of research and develop appropriate technologies.

IV. SCIENCE CENTRES

The establishment of Science Centres, Clubs, Museums, Herbaria and Planetaria in various provinces of the country is one of the important functions of the PSF. Progress made by the Foundation in this regard is as follows:-

a) Science Centre

During the report period the Foundation arranged a number of talks/lectures filmshows etc. for creating public awareness and generating general interest in Scientific and Technological Advancements within and outside the country. Some of the talks/meetings arranged are mentioned below:-

- Origin of Life

- The World Environment Day Celebrations.

b) Science Fairs/Exhibitions

During the report period the Foundation sanctioned an amount of Rs.1,34,500/- to the following Organisations to enable them to participate/organise Science Fairs in the country.

1. An amount of Rs.25,000/- was given to the Board of Intermediate and Secondary Education, Sargodha to organise a Science Mela. The mela lasted for eight days i.e. from 12-23rd Dec. 1982, and all the Schools and Colleges of the Sargodha Board participated. As a result of this fair, the British Council offered free air journey to London and back to Miss Mehtab Ashfaq of Government Comprehensive High School, Sargodha who won the first prize.
2. An amount of Rs.50,000/- was sanctioned to the Pakistan Association of Scientists and Scientific Professions for organising a Scientific Industrial and Technical Research exhibition at Lahore from 2nd-6th June, 1983. The exhibition was inaugurated by Lt. Gen. Saeed Qadir, Federal Minister for Production.
3. An amount of Rs.30,000/- was sanctioned to the University of Engineering and Technology for organizing an Electronics and Engineering Exhibition held in November, 1982.
4. An amount of Rs.29,500/- was sanctioned to the Pakistan Museum of Natural History for participation in the Science Exhibition sponsored by the Board of Intermediate and Secondary Education, Lahore.

c) Establishment of the Pakistan Museum of Natural History

The general aim of the research done in Pakistan Museum of Natural History is to collect as much information as possible on identification, natural history, distribution and ecology of plants and animals, fossils rocks, minerals, etc. Besides education of general public for learning about the natural wealth of the country and its economic and aesthetic value to the mankind, is also one of the major activities of Pakistan Museum of Natural History. The research activities are being carried out by three divisions, namely Zoological, Botanical and Earth Sciences Divisions, while a Designing Section is fully operative in helping out with displays of Scientific knowledge accumulated by these divisions.

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

I. BOTANICAL SCIENCES DIVISION

1. Field/Laboratory Work

a) Plant Collection

Field trips to Ayubia, Nathiagali, Dungagali, Murree, Hasan Abdal, Burhan, Hattian, Turbets Dam and Kotli were arranged for the collection of higher and lower plants apart from local collection. The adjoining areas of the capital like Margalla Hills, Barakau, Chattar, Kalar Kahar etc. were also surveyed. More than 1100 plant specimens of higher plants were collected from the above-mentioned localities. Similarly about 200 specimens of fungi and more than 80 specimens of algae and bryophytes were also gathered. About 20 specimens of seeds were collected from Lahore and Peshawar.

b) Preservation/Drying

The higher plants were dried by applying internationally recognised drying techniques using blotting papers while the lower plants like algae, bryophytes and some of fungi were preserved in formol, while the rest were dried in the sun.

c) Poisoning

2-3 grams of copper sulphate or mercuric chloride had been applied to 100 ml of absolute alcohol for poisoning the plant material. Most recent disinfested method of deep freezing of plants is also being used. More than 1000 plant specimens have been poisoned during the year.

d) Mounting

About 900 poisoned plants have been mounted on herbarium sheets containing all the necessary data for reference study.

e) Identification

Higher Plants

About 550 higher plants were identified during the year. These plants belong to the following families:-

- | | | |
|-------------------------|----------------------------|------------------------|
| a, <u>Malvaceae</u> | b, <u>Leguminosae</u> | c, <u>Spaindaceae</u> |
| d, <u>Tamaricaceae</u> | e, <u>Abpcynaceae</u> | f, <u>Liliaceae</u> |
| g, <u>Compositae</u> | h, <u>Scrophulariaceae</u> | i, <u>Poaceae</u> |
| j, <u>Aceraceae</u> | k, <u>Acanthaceae</u> | l, <u>Alismataceae</u> |
| m, <u>Anacardiaceae</u> | n, <u>Aizoaceae</u> | o, <u>Solanaceae</u> |
| p, <u>Papilionaceae</u> | q, <u>Euphorbiaceae</u> | |

More than 300 plant specimens were identified for other organizations like PARC and Q.A.U., Islamabad apart from identification for the students of F.G. College for Women, Islamabad.

Lower Plants

More than 50 species of algae have been identified belonging to the following genera:-

- | | | |
|------------------------|----------------------|----------------------|
| a, <u>Oacillatoria</u> | b, <u>Cladophora</u> | c, <u>Oedogonium</u> |
| d, <u>Spirogyra</u> | e, <u>Cosrarium</u> | f, <u>Voluox</u> |
| g, <u>Fragilaria</u> | h, <u>Synedra</u> | i, <u>Cyclotella</u> |
| j, <u>Trabellaria</u> | k, <u>Navicula</u> | l, <u>Gomphonema</u> |
| m, <u>Phormidium</u> | | |

Similarly more than 100 speices of fungi belonging to Ascomycetes and Basidiomycetes have been identified. Most of the fungi are saprophytes on dead logs, while others collected on forest floors. Some were found parasitic on conifers and broad leaved trees.

f) Photography

Special trips were arranged to Murree Galiat and Margalla to photograph the plant communities of natural conifers and scrub forests with close ups of important timber plants. The undergrowths of herbs and shrubs were also photographed. Moreover snaps of cereals and fiber crops were also taken.

2. Display

a) Life cycles of Algae, Fungi, Bacteria, Virus, Bryophytes, Pteridphytes, Angiosperms and Gymnosperms have been completed.

- b) The display of "Evolution tree" indicating origin and evolution of different types of plants has been completed.
 - c) The urdu write up of Timber, Fiber, Paper and Pulp and Oil seeds has been handed over to design section for display.
 - d) The day and night desert diorama has been completed.
 - e) Diorama pertaining to Forest and Agriculture with its problems is in progress.
3. *Project submitted to PSF*
- a) Ecotoaxonomic Evaluation of valuable plants of Baluchistan.
 - b) Ecosystematics of Crop Weeds of Pakistan.
4. *Publications*
- a) A book on Dangerous Plants of Pakistan has been completed.
 - b) A monograph entitled; "Soma as medicinal plant - its History and Natural History" is being edited.
 - c) Family Lemnaceae of Rawalpindi/Islamabad has been completed.

II. *EARTH SCIENCES DIVISION*

1. *Research Activities*
- 1. Submitted two research projects to Science Foundation for the approval of the financial grant.
 - 2. The third research project is being reviewed by the Science Foundation.
 - 3. The Petrographic studies of the Khewra Sandstone from Khewra Gorge are in progress.
 - 4. The Geochemical and Petrographic studies of the Baghanwala Formation from Khewra Gorge are in progress.
 - 5. The Petrographic studies of the Kusak and Jutana Formation from Khewra Gorge are in progress.
 - 6. Dr. Baqri presented two papers in the Seminar on Science & Technology in collaboration with the North American Scientists. Dr. Butt also delivered a lecture about the deep sea drilling techniques.
 - 7. Dr. Baqri presented two papers in the all Pakistan Science Conference, Karachi which was held in December, 1983.
 - 8. Dr. Baqri submitted one paper to be published in the research journal of Azad Jammu and Kashmir University. Dr Baqri also submitted two more papers at Geological Conference at Bristol, England respectively.

9. Mr. I. U. Cheema published one paper on small Mammals in GSP. He also prepared another paper on Bugti Fauna from Baluchistan which would be published soon.

2. *Museum Display Arrangements*

1. The diagrams related to the display of rocks, minerals and fossils were prepared to display in their respective sections.
2. A new section for the display of invertebrate fossils was established.
3. The continental shelf diagram was designed, prepared and supervised for its three dimensional display.

3. *Geological Field Work*

Geological field workers carried out geological field works in Salt Range, Talagang and Nowshera areas.

4. *Contact with other Organizations*

1. Carried out discussion for a joint project about the geological studies of the Pakistani ocean.
2. Carried out discussions with Dr. Kemps about the arrangement of minerals in the Earth Sciences Division. Dr. Kempe is the Deputy Keeper of Mineralogy in British Museum of Natural History. Also arranged a lecture of Dr. Kempe.
3. Carried out detailed discussions with Mr. Goosling and Dr. Clark from the British Museum of Natural History. Also arranged their lecture about the Natural Museums.
4. Carried out detailed discussions with Dr. Taseer Hussain about the Natural History Museum. He also delivered a lecture.
5. Carried out detailed discussions about the joint research projects with G. S. P. and P.M.D.C.

5. *Training*

1. Arranged the geological field training of the field assistants.
2. Arranged the training of the Research Associates in differential thermal analysis and X-ray diffraction studies of the minerals.

6. *Consultancy*

1. Dr. Baqri revised the syllabus of applied geology University of Azad Jammu & Kashmir.
2. Dr. Baqri delivered special lectures in petroleum geology to the third year students of applied geology from the University of Azad Jammu & Kashmir.

III. *ZOOLOGICAL SCIENCES DIVISION*

1) *Current Research Projects:-*

- a) Community structural analysis of sap-sucking insects in relation to vegetation composition.
- b) Preparation of check-lists of land and aquatic groups of hemipterous insects of Pakistan.
- c) Multivariate analysis of aquatic bird communication of Sind.
- d) Taxometric analysis of the rice bugs of the World.
- e) Taxonomic study of Coridius janus complex.
- f) Studies on biology of reptiles in Pothohar region of Pakistan.

2) *Completed Research Projects:-*

- a) Checklist, Synonymy and key to the genera and species of Alpheid shrimps of Karachi Coast.
- b) Distribution and abundance of two noctuid pests of cultivated forest in Islamabad.
- c) Computer programming of insect numeric taxonomic and quantitative ecological method on a microcomputer system.

Research Articles completed

1. Distribution and abundance of two noctuid pests of cultivated forests in Islamabad.
2. Check-list, synonymy and key to the genera and species of Alpheid shrimps of Karachi Coast (submitted for publication).

3. Check-list and key to genera and species of aquatic mites of Pakistan.
4. A new genus and a new species of Halyini st°Al (Hemiptera: Pentatomidae: Pentatominae) with a note on its relationships (submitted for publication).
5. Four new species of genus Dolycoris st°Al (Hemiptera: Pentatomidae: Pentatominae) from Pothohar valley of Pakistan.
6. Isolation, purification and characterization of haemolymph amylases of hibernating rice stem-borer larvae, Shoenobuis incertulas (Walk.) (submitted for publication)
7. A simple low cost artificial diet for mass rearing of gram pod-borer, Heliothis armigera (Hub). (Lepidoptera: Noctuidae) (Submitted for publication).

3) *Display Activities*

A zoological diorama displaying various animal life forms in different ecological regions of Pakistan is almost completed. The diorama is primarily meant for education of general public about the diversity of the natural faunistic heritage of the country. This is expected to enhance the aesthetic sense of a layman for developing interests in bird watching, butterfly collection, animal behaviour etc. which would be a step towards participation in conservation of the natural living wealth. The diorama is equally expected to enchant children of all ages in order to divert their inquisitiveness to acquisition of knowledge about natural history. In the same way a marine diorama is on its way to completion in collaboration with the Earth Sciences Division to fulfil a similar aesthetic and educational role.

The children discovery room is supplied with several mini-dioramas and other zoological displays to educate children about structure, habits and habitats of enchanting animals.

4) *Contact with the other Organization*

1. Carried out statistical analysis for pulses programme of National Agricultural Research Centre (PARC).
2. An antibiotic index was worked out for Mr. Nawab Khan Marwal, a Ph.D. Scholar of Agricultural University, Faisalabad.

3. Helped out 6 M.Phil students of the Department of Biological Sciences, Quaid-i-Azam University, Islamabad in completion of their dissertation.

IV) DESIGN SECTION

The rejuvenescence of the Natural History Museum was started after demolishing the older structure. A designing studio was first established to undertake planning of interior and exterior construction of the building. The current status of all these items is as follows.

1.	Reception cabin	completed
2.	Souvenior shop	in progress
3.	Children discovery room.	in progress
4.	Audio vistual room	in progress
5.	Herberium information cell.	completed
6.	Insecterium information cell.	in progress
7.	Earth Science information cell.	in progress
8.	Evolution Tree of plants	completed
9.	Girrafe painting	completed
10.	Evolution of Higher Mammals.	completed
11.	Zoology Diorama	completed
12.	Rock, Mineral and Fossils display	completed
13.	Desert Diorama	completed
14.	"Marine Environment Diorama	in progress
15.	Plants Diorama (Botany)	in progress
16.	Mushroom life cycles	completed
17.	Transperancy Boxes	completed
18.	Laboratory Furniture	completed

V. **SCIENTIFIC SOCIETIES/LEARNED BODIES**

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

The Foundation is making annual grants to the established learned bodies and scientific societies and endeavouring to provide all possible assistance to the new ones. Annual grants amounting to Rs.4,70,000/- were released during the year to various non-governmental scientific societies and learned bodies for the achievement of their approved objectives (Annexure-IV).

Special grants totalling Rs.3,67,000/- were sanctioned to various scientific societies/institutions for their publication programmes.

VI. **SCIENCE CONFERENCE**

Organization of periodical Science Conferences, Symposia, Seminars etc.

During the period, grants totalling to Rs.4,14,885/- were given to various scientific organization and institutions for holding seminars, symposia and conferences (Annexure-V). A brief account of some of the seminars is given below:-

- (a) The 2nd Summer School in Science, and organised by the Board of Intermediate and Secondary Education Lahore from 1st to 19th August, 1982 at Khanpur. The aim of the Summer School is to present an over view of Science and Scientific enterprise to the young talented students of Intermediate Classes with a view to encouraging them to accept the challenge of modern science and technology. The Foundation sanctioned a grant of Rs.20,000/- as partial financial assistance to the Board for organizing this Summer School.
- (b) The symposium, on role of Universities in Improving Scientific Education and Research was organised by the University of Karachi from 10th - 11th August, 1982. The aim for organising this symposium was to create proper atmosphere conducive for scientific education and research in the country. A large number of participants from various autonomous and semi autonomous organisation

attended this symposium. The Foundation sanctioned an amount of Rs.10,000/- for the publication of the proceeding of the above national symposium.

- (c) The Foundation sanctioned an amount of Rs.30,000/- to the HEJ Research Institute of Chemistry, Karachi for organising the 1st International Symposium on the Chemistry of Natural Products. The grant is to be spent in meeting TA/DA of Pakistani Scientists attending the said symposium.
- (d) The Ministry of Science and Technology in collaboration with U.S. National Science Foundation organised the International Symposium - Workshop on Renewable Energy Resource held at Lahore from 18-22 March, 1983. This symposium provided in depth information in the growing fields of renewable Energy R&D including fundamentals and utilization with special emphasis for Solar belt countries. More than 500 scientists from 30 countries participated. An amount of Rs.one lac was sanctioned by the Foundation for this International Symposium.
- (e) The International Conference of Pakistan Dental Surgeons was organised by the College of Physicians and Surgeons, Karachi and Rawalpindi from 22-26th March, 1983. The Foundation sanctioned an amount of Rs.30,000/- to the organisers for the publication of the Conference proceedings.

VII. EXCHANGE OF VISITS

Exchange of visits 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 countries and the absence of intellectual inter-action, many of our scientific workers become obsolescent and lose enthusiasm, freshness and spontaneity. There is an urgent need to end the isolation from world science of Pakistani science and scientists. Our scientific workers should be able to meet their counterparts in the advanced societies, and visit international and regional research centres and universities of repute.

Grants totalling Rs.26,369/- were given to two scientists (Annexure-VII) to attend International Conferences/Symposia and to meet their counterparts in Institutions of higher learning 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 granted one fellowship to Dr. Zafar Javed, @ of Rs. 900/- p.m. for a period of two years for his M. Phil studies at the Post-Graduate Medical Institute, Lahore in the field of Bio-chemistry. An amount of Rs. 10,800/- was released to Post-Graduate Medical Institute on account of 1st years' fellowship.

Five fellowships @ Rs.1500/- each were given to the Nuclear Institute of Agriculture and Biology for the participants of the 10th Annual Post-Graduate Course on Nuclear and other advanced techniques in Agricultural and Biological Research.

IX. SURVEY AND STATISTICS

The project entitled "Impact of non-dietary factors on the Nutritional Status of people of Pakistan", awarded to Dr. Siraj-ul-Haq Mahmood progressing satisfactorily. During the report period the relevant literature, primary and secondary data was collected. The food balance sheets for the last three decades were prepared and analysis of data at computer centre and projection work for demand for food items started. The research work is progressing as per schedule.

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 three 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 P.S.F. to assess the interim progress of these projects.

ii) First and Second Annual Reports

As many as fifteen First Annual and seven Second Annual reports submitted by the Principal 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 Committees for consideration alongwith the evaluation reports of the experts concerned, which were ultimately accepted by the Technical Committees.

iii) Final Reports

Twelve final reports in respect of the completed projects received during the year under report, were also submitted to the subject experts for review and evaluation and on receipt back from them, were submitted to the relevant Technical Committees for adoption.

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 SCIENTISTS POOL

The scientists who had returned from abroad after completing high education and were looking for jobs suited to their qualifications were placed on the scientist pool and assigned to various universities.

In addition, biodata of fifteen Pakistani Scientists living abroad and interested in returning to Pakistan were circulated amongst various Universities and Research Institution in order to assist them in finding appropriate employment in Pakistan.

XII. INTERNATIONAL LIAISON

Liaison with International Agencies and Scientific establishments in different countries serve as a means to solve numerous scientific problems by sharing knowledge, exchange of expertise, collaborative research etc. Such agencies were accordingly contacted. Besides, representatives of several foreign organisations paid visits to the Pakistan Science Foundation in order to explore possibilities of collaboration in scientific programmes of mutual interest.

Dr. M. Said, Professor, Department of Geography visited United Kingdom under the Memorandum of Understanding signed between the Royal Society of London, U.K. and the Pakistan Science Foundation from 11th-30th September, 1982. Dr. Said visited different research Institutes in U.K. The Foundation sanctioned return air fare from Pakistan to U.K.

Dr. R. R. F. Kinghara, Department of Geology, Imperial College, London visited Pakistan as nominee of the Royal Society of London from 15th - 17th March, 1983. He visited Geology Department at various universities in Pakistan, including Hydrocarbon Development Institute of Pakistan's Laboratories and discussed long term planning for a proposed organic geo-chemical research programme. The Foundation provided local hospitality during his stay.

CHAPTER - 2

PROGRESS OF PSF SUPPORTED PROJECTS

An account of the progress reports of PSF supported projects, received during the year 1982-83, is given below:-

(A) *Final Reports*

During the year under review, twelve final reports were received. Particulars of these schemes and brief summaries of the achievements made in these projects are as under:-

Project No:	P-PU/Bio (50/1)
Project Title:	A survey and control of Silkworm diseases in Pakistan and Azad Kashmir.
Name of Investigator:	Dr.Rafat Hussain Jafri
Project Particulars:	
-Duration	Three years
-Date of commencement	15-4-1977
-Date of completion	14-4-1980
-Implementing Agency	University of Punjab, Lahore.
-Total Expenditure:	Rs.2,32,856/-
Main objectives:	A survey of diseases of silkworm in NWFP, Azad Kashmir and Punjab was conducted under a PSF grant during the year 1975-77. The survey has revealed the presence of several pathogens such as <u>Nosema Bomycis</u> , <u>Nuclear Polyhedrosis virus</u> , <u>Bacillus thurenquiensis</u> , <u>staphyllococi</u> , <u>proteus</u>

valagaris, E. Collie etc. in the Larvae pupae, moths and eggs of silkworm. These pathogens were isolated, techniques for their quick identification were developed and the modes of the transmission of some of the pathogens were established. This project which is the extension of the above work aims at investigating suitable control measures for the silkworm diseases and to improve the quality of silk.

Summary of the Work Done

The rearing period of B.mori was investigated. In Punjab, the rearing period of involtine races of silkworm starts in the last week of February and continues up to the second week of May in NWFP. The rearing period of univoltine races of B.mori starts in the first week of March, and continues upto the middle of June. In Azad Kashmir, the rearing period of B. mori (univoltine races) starts in the first week of March and continues up to the end of the June. These are various ecological zones in each province. There are fluctuations in the rearing period due to variations in temperature and humidity conditions of the areas concerned.

The details of Morphology, Biology and Anatomy of B. mori were studied in the laboratory. Biology of B. mori was also studied in the rearing areas.

Diseased eggs, larvae, cocons and moths were collected from all over the rearing areas. The time table of the appearance of diseases was investigated. In Punjab, diseases appeared in various areas (Multan, Pirawala, Chichawatni, Changamanaga, Gujranwala, Sialkot, Gujrat Daffar, head Faqiria, Kahuta, Naushera, Textila Hazro, Sargodha, Cambellpur, Hassanabdal and Rawalpindi areas). The diseases appeared during the first week of March and continued to cause a high mortality of larvae up to the beginning of May, In NWFP diseases appeared in various areas (Peshawar, Mardan, Hairpur, Bannu, Kohat, Parachinar, Miranshah, Swat, Dir, Lower Chitral and Upper Chitral). The disease appeared in epidemic form in the last week of April, and out-break continued upto the middle of June. In Azad Kashmir, diseases appeared in various areas (Mirpur

Afzalpur, Bhimber, Muzaffarabad, Hajera, Bagh, Kotli, Khoeratta, Punjab, Tattapani, Pangera, Sehansa, Palendri, Tarakhel, Rawalakot Leepa Vallet etc.). The diseases appeared in the last week of April and the epidemic continued up to the middle of September.

Symptoms of diseases were studied in larvae, pupae and moths. The Pathogenes were isolated from larvae, pupae coccons, moths eggs and rearing areas. Techniques were developed for quick pathological analysis and histopathology.

In the developing countries, Sericulture is essentially a village based and welfare oriented industry capable of proving employment to large sections of the population.

The insect producing mulberry silk is a domesticated variety of silkworm. All the strains, reared at present, belong to the species Bombyx mori, and have become susceptible to disease in Pakistan.

Project No:	S-SU/Bio (57)
Project Title:	The culture collection of Algae of Pakistan at the Sind University.
Name of Investigator:	Dr. Shahnawaz Arbani.
Project Particulars:	
-Duration	3 years
-Date of commencement	1-4-1976
-Date of completion	31-3-1978
-Implementing Agency	Sind University, Jamshoro.
-Total Expenditure	Rs.2,13,253/-.
Main objectives:	The scheme aimed at establishing a centre for the culture collection of algae of Pakistan. The Centre, when established will not only save foreign exchange on importing algal strains, but will also meet the needs of all the institutions engaged in research on the

subject in the country.

Summary of the Work Done

The project was concerned with the collection and culturing of Algae of Pakistan.

The culture of Algae belonging to Cyanophyceae, Chlorophyceae are important as they serve useful materials for physiological and genetical research, as well as in basic studied in morphology, taxonomy, cytology and ecology of these groups.

Algal species, collected from temporary and permanent ponds of Thatta, Dadu, Larkana, Hyderabad and Khairpur Districts of Sind were brought into unialgal and pure forms. About 625 collections were made. Out of 143 species identified only 100 species were maintained in unialgal and pure forms.

Project No:	S-ZSD/Bio (90)
Project Title:	Survey of the reptilian fauna of Sind.
Name of Investigator:	Mohammad Farooq Ahmad
Project Particulars:	
-Duration	2 years and three months extension.
-Date of commencement:	1-9-1979
-Date of completion	31-12-1981
-Implementing Agency	Zoological Survey Department, Karachi.
-Total Expenditure	Rs.80,580/-
Main objectives:	The project envisaged to (i) undertake Survey of Reptiles in the province of Sind, (ii) Study their distribution ecology and behaviour; (iii) investigate the causes of decline in the population of certain important species.

Summary of the Work Done

As a result of extensive faunistic surveys in the province of Sind and on the basis of taxonomical studies made on the material collected, it has been possible to record the occurrence and distribution of 84 taxa of Reptiles so far in these areas along with their ecology and status. Such detailed studies have not been made previously with regard to the Reptiles of Sind. A number of species have been collected from various districts and marked by asterisk which were not collected previously from these areas by Minton or some other herpetologists. Turkestan Rock Gecko is a new record in Sind as it has been collected from Baluchistan only in the past.

Habitat of these reptiles was thoroughly studied in all the districts and thus distribution of the reptilian fauna was noted. Status of a particular species is based on the relative abundance and in some cases population estimates in the peak seasons. The reptilian fauna is divided into 5 categories viz. Common, Less Common, Rare, very Rare and abundant.

On the whole, as mentioned in the status of various reptilian species in different districts, it is evident that out of 84 taxa 4 are very rare, 15 rare, 26 less common, 28 common and 11 are abundant. Like higher wild fauna (Mammals and birds), reptilian fauna is also on decline. Gharial and Crocodile once common are now on the verge of extinction.

Rare and very rare reptiles were less common or common and in some forms were almost abundant few decades ago. Rarity of the reptilian fauna is the result of destruction and the shrinkage of the natural wild environment, exploitation of the fauna on large scale for industry, large scale killing of the so called fearful species and taking over their habitat for settlement by human race. Majority of snakes are non-poisonous but the snakes are killed whenever encountered. Wildlife exporters have also destroyed the reptilian fauna so much for the export of the skins of snakes, lizards and Monitors in the past decade that other factors could not do so in three decades. Python, for example, which was almost common, though restricted to peculiar locations, in Thatta District before the start of the past decade is now very rare and if proper conservation attempts are not taken it would be exterminated within this decade. Similar is the case of Monitors, Cobra, King Cobra etc. Spiny-tailed Lizard though still common in many areas is rapidly decreasing in number and it is feared that it will reach the verge of extinction if casual factors are continued in the future.

Project No:	P-CSIR/Chem (93)
Project Title:	Production of various types of enamles.
Name of Investigator:	Dr. M. A. Beg
Project Particulars:	
-Duration	One year
-Date of commencement:	1-1-1981
-Date of completion	31-12-1981
-Implementing Agency	PCSIR Laboratories, Lahore.
-Total Expenditure:	Rs.37,128/-
Main objectives:	To develop enamles of specific properties suitable for painting metal wares.

Summary of the Work Done

Sixty samples of enamel powders were prepared and applied on sheet iron test plates. On visual inspection samples were selected for further studies. Blistering, bioling, burning off, chipping, crawling and fish scale defects were noted in most of the samples. Samples having any of these defects were discarded.

The objectives of comparability with imported stuff and reduction in the cost of manufacture of enamel powders were kept in mind. Reduction in the cost of manufacture have been done by two methods, i.e. by replacing totally or a part of expensive chemicals by less expensive chemicals and lowering the fusion temperature of enamels, the temperature at which the enamels are fired on the ware. The low temperature means low fusion cost and on sheet iron particularly distortion difficulties are minimized.

Project No:	P-PU/Earth (24)
Project Title:	Geochemistry and Minerology of Speckled sand stone and related Rocks of the Salt Range Punjab.

Name of Investigator: Dr. F. A. Shams

Project Particulars:

- Duration One year
- Date of commencement 1-11-1980
- Date of completion 31-10-1981
- Implementing Agency: University of Punjab, Lahore.
- Total Expenditure: Rs.45,460/-

Main objectives: To carry out detailed geo-chemical and mineralogical analyses of the speckled sand stone formation and to find out quantitatively the real potential of the work.

Summary of the Work Done

The project was undertaken on the basis of old report that Copper minerals occur in the Warchha Sandstone and the Sardhai Formation of the Salt Range, Punjab.

During course of present work however, it was found that the Copper mineral reported by earlier workers, were infact alteration products of primary minerals of the Cu-Fe-Sn-S system. The most important mineral found was Stannite as two varieties i.e. green variety $Cu Fe Sn S$ and brownish variety $Cu Fe Sn S$. Another Tin mineral was Cassiterite while Copper minerals found were Chalcopyrite, Cuprite, Mallchite and Native Copper. In addition Tungsten mineral, Scheelite $CaWO_4$, was also found which could be the alternation of primary Tungsten mineral, Wolframite $(Fe, Mn) WO_4$. Sensitive paper chromatography technique showed also the presence of Managanese, Nickel and Cobalt. These elements could be present in various minerals. And this came as significant result of the present study, particularly as such important minerals were neither known to occur anywhere in the salt Range, particularly the formation tested, nor were normally expected on the basis of previous work. These results opened a new chapter in the geology and mineral potential of the Salt Range formation, particularly of the Palaeozoic age.

Project No:	C-NHL/Med (26)
Project Title:	Study of Streptococcal infections Rheumatic Fever Rheumatic Heart disease in Rawalpindi and Islamabad.
Name of Investigator:	Dr. Abdul Ghafoor
Project Particulars:	
-Duration	One year
-Date of commencement	15th April, 1976
-Date of completion	14th April, 1977
-Implementing Agency	National Institute of Health Islamabad.
-Total Expenditure:	Rs.20,000/-
Main objectives:	To Survey the Carrier rate of group A Streptococci and its relationship to Rheumatic fever and Rheumatic heart disease in organized communit- ies like School, Colleges and other Institutions.

Summary of the Work Done

Streptococcal throat infection is quite prevalent and this can be more common in Urban Areas and in crowded communities. Group A Streptococcal infection by itself is hazardous from the view point that it leads to serious consequences such as heart disease which effect the well being and productivity of the patients. It is therefore necessary that the prevalence of this infection and its sequelae may be studied systematically.

Under this project, the prevalence of Streptococcal infection in Rawalpindi/Islamabad and their relationship to Rheumatic disease and subsequent development of Rheumatic heart disease were studied.

It was observed that Streptococcal infections cause morbidity and their complications in the form of Rheumatic fever and heart disease may cause permanent disability particularly in children.

This however is a preventable disease, if the extent of prevalence of streptococcal infections is known. Also by taking adequate measures the complications can be avoided as the extent of prevalence in the general population may be less than what has been given in the report. It has been recommended that attention be focused on the school going children and their families in whom this infection is quite common.

Project No: C-AFMC/Med (31)

Project Title: Studies on Nutrition Problems among families of Armed Forces Personnel

Name of Investigator: Col. Ashfaq Ahmad

Project Particulars:

- Duration 2 years
- Date of commencement 1st September, 1976
- Date of completion 31st October, 1977
- Implementing Agency Armed Forces Medical College, Rawalpindi.
- Total Expenditure Rs.43,000/-

Main objectives: To determine the effect of intake of full amount of 80,000 K. calories above the normal requirement during pregnancy and lactation and the effect on the total food requirement.

Summary of the Work Done

High fertility and uncomplicated pregnancy ending in spontaneous delivery of a live vigorous child followed by a successful Lactation and involution indicate good reproductive efficiency. Maternal height, more than any other single factor has consistently been found to be correlated with efficient reproductive performance. The importance of maternal nutrition as a determinate of the course and outcome of pregnancy is evident. The dietary intake by the mother

during the course of pregnancy has to match the requirement of the mother and foetus if the growth of foetus is not to be retarded and maternal reserve depleted which would not fail to have an adverse effect on the maternal health and course and outcome of future pregnancy.

In the present study 450 serial cases of pregnancy of 20-weeks duration or less were registered for check-up of which 215 completed their pregnancy during the one year period under review. The socio-economic physical dietary, weight gain, haematological and biochemical parameters of the mother were related to each other and to birth weight of the baby in an attempt to evaluate the nutritional problems of pregnant women in Pakistan. The average dietary intake was found to have calories 72% proteins, 12% Calcium, 33% Iron 41% Vitamin B, 11.4% B, 41% Niacin 100% and 064% of the recommended intake.

It was concluded that the diet therefore is adequate in proteins, vitamin B and Niacin content only. The crucial deficiencies are in calories Ca & Fe. This deficiency is due to low Caloric density of traditional Pakistani diet due to low fat intake. The data gathered so far bring out the importance of adequate pre-pubertal nutrition of female to permit the full realization of the growth potential of our women. There is also an unequivocal evidence of the need for Fortification of atta with Calcium and iron in order to overcome the shortage of these two important minerals.

Project No:	C-AFMC/Med (34)
Project Title:	Mapping of the Chemical Constituents of Water in Pakistan.
Name of Investigator:	Col. Ashfaq Ahmad
Project Particulars:	
-Duration	2 years
-Date of commencement	1st August, 1978
-Date of completion	31st January, 1980
-Implementing Agency	Armed Forces Medical College, Rawalpindi.

-Total Expenditure

Rs.12,300/-

Main objectives:

To study the Chemical Constituents of water specially from deep sources.

Summary of the Work Done

The Chemical quality of water is directly related to the health of the people consuming it and the Chemical constituents of water determine the quality of water to a very great extent. The deficiency of iodine may cause goitre. The high content of sulphates and total solids may act as gastric irritants and affects the efficiency of gastro-intestinal system. The nitrate and nitrites have also been proved to be health hazards. This had necessitated conduction of survey of chemical constituent of drinking water of the country.

Under this project 401 water samples were collected from different parts of the country and were examined physically and chemically in accordance with the standard methods of analysis of water and waste water by American Association of Public Health.

It was concluded that out of total examined samples 28.5% contained total solids higher than desirable; 30.25% samples were found higher in sulphate contents; 5% samples were found high in nitrate content. Iron was not detected in any of the water sample. However nitrites were present in most of the water supplies. Information so gathered is important in determining the incidence of such disease as kidney stone, gastric disturbances leading to anemia, acute Osteomalacia, goitre and dental caries. It is also useful for basic information in many other aspects and future work.

Project No:

P-PMI/Med (49)

Project Title:

High altitude research Changes in Renal Function.

Name of Investigator:

Dr. Farrukh A. Khan

Project Particulars:

-Duration

3 months

-Date of commencement

2nd June, 1981

-Date of completion	31st October, 1981
-Implementing Agency	Post-Graduate Medical Institute, Lahore.
-Total Expenditure	Rs.40,500/-

Summary of the Work Done

High altitude research is vitally important for countries with population functioning at height over 10,000 feet. Pakistan has some of the highest ranges in the world. High Altitude Medical Research includes large number of diverse fields. Basically this type of research covers the physiological reactions of low landers to acute and chronic exposure to high altitude and the changes in body function in permanent high landers. There are large number of variables which may co-exist. Goiter problems and worm infestation is well known in our northern areas.

Acute exposure to high altitude, in the unacclimatized, often produces acute mountain sickness and in some acute pulmonary Oedema. The kidney plays a key role in the adjustment of the body to its new surroundings.

Under this project estimation of hormones and Ion level in Serum and urine of the subject at different heights, was included. It was observed that under normal working conditions renal electrolyte handling, blood pressure and renin aldosterone changes were significant. Acute high altitude exposure produce profound and complicated changes in the human body. Inability to acclimatize can incapacitate or even lead to death of an individual. Renal response to high altitude exposure is the out come of large number of compensatory tendencies on the body. Besides the effect of altitude the Stress of exercise and dietary change also influence the renal response. The ultimate renal response is the final out come of these stresses.

Project No:	C-QU/Med (55)
Project Title:	Hormonal levels and Secretary Pattern in Rhesus Monkeys with Induced Poly cystic ovaries.

Name of Investigator:	Dr. M. Arsalan
Project Particulars:	
-Duration	One year
-Date of commencement	28th July, 1981
-Date of completion	27th July, 1982
-Implementing Agency	Quaid-i-Azam University, Islamabad.
Main objectives:	To compare the hormonal profile in blood, ovarion tissue and follicular fluid is intact Monkey and animals with induced cystic overies, and to assess the gonadotropin response of normal cystic overies.

Summary of the Work Done

Follicular development in ovaries but not resulting in ovulation (e.g. polystic ovarian syndrome) is a common cause of abnormal reproductive cycles and infertility in women, cattle and some laboratory mammals. Although the histological changes characteristic of the polycystic ovaries are well recognized, yet the setiology and pathophysiology of this syndrome remains obscure. The reported changes in hormone production in polycystic ovarian syndrome in women, have been shown to be highly variable.

In order to investigate further, the endocrine changes resulting in infertility due to hypertrophy of the ovarian follicles unaccompanied by ovulation, a suitable animal model is needed in which a comparable condition of ovarian abnormality can conveniently be induced. The rhesus monkey has widely been used as a model for studies on human fertility. The present study was carried out to (a) induce experimentally an abnormal development to ovarian follicles, morphologically comparable to the polycystic ovarian condition and (b) investigate changes in ovarian histology and plasma steriod levels using immature and adult female rhesus monkeys.

Follicular development was achieved by injection 150 lu of PMSG daily for a period of 10 years. The follicular development

was assessed through laparotomies performed prior to and following gonadotropin treatment. Blood samples were collected before initiation of treatment, during treatment and following cessation of injections. Oestradiol 17B, progesterone and testosterone was measured by radioimmunoassays.

In untreated immature monkeys the small ovaries contained very few follicles large than Imm. Following treatment with PMSG, the volume of the ovaries increased several fold and these structures appeared as globular structures because of the presence of large fluid filled follicles (2-11mm in diameter). Histologically the ovaries possessed a thickened tunica and the number of primary follicles was drastically reduced. The large follicles occupied almost the entire thickness of the ovarian cortex. The interfollicular tissue was developed extensively and was pervaded with collagenous and fibrous connective-tissue. Stromal tissue and thecal layers of ovaries of treated animals, contained secretory cells. In most cases the granulosa layers were several cell thick and many of the granulosa cells, exhibited necrotic changes. As in the immature female animals, PMSG administration of 10 days initiated at the beginning of the cycle to adult females, resulted in a marked growth of ovarian follicles in all the three animals. The follicles possessed large fluid-filled antra. Numerous degenerating granulosa cells and cell debris could be seen in the follicular fluid. Most of the granulosa cell appeared a typical in morphology. The thecal wall was well developed consisting of thick connective tissue fibres and secretory cells were presented near the inner border.

The plasma oestradiol 17B levels in immature and adult females increased significantly during the PMSG treatment and were maximum between 5-8 days following the first injection. Except in one adult monkey, oestradiol 17-B concentrations declined following cessation of treatment. A parallel increase in progesterone levels was also recorded during the treatment period. In animals belonging to both age groups, there was a steady increase in peripheral testosterone levels and a 3-6 fold increase at the end of the treatment period was recorded.

The present study demonstrates that ovarians function of immature and adult monkeys can be stimulated in response to chronic treatment with PMSG and that this treatment results in the development of large fluid filled multiple follicularysts without any evidence of ovulation. In the present experiment, induction of a state in the rhesus monkey comparable to polycystic ovarian syndrome is suggestive of an abnormal stimulation of monkey ovary with a heterologous gonadotropin (PMSG) treatment. Furthermore

this investigation indicates that in addition to elevated levels of oestrogen and progesterone, significantly increased levels of testosterone were found in the PMSG trained adult and immature female monkeys. It may be pointed out that peripheral testosterone levels are reported to be generally higher than normal in patients with the polystiovary syndrome.

Based on the present observations on the rhesus monkey we concluded that (a) chronic treatment with PMSG brings about an aberrant development of the ovarian follicles resulting in a condition resembling the polycystic ovaries in the human and testosterone sterilized female rats, (b) PMSG may initially bring about a modification of the normal ovarian steroidogenic function (e.g., androgenesis) but an abnormal steroid production may ultimately be responsible for the polycystic condition (viz the hypothalamicpituitary axis), (c) administration may induce in the monkey and inappropriate pattern of gonadotropins (resulting in a condition comparable to that found in PCO syndrome) as a result of which certain ovarian cell types are preferentially stimulated. The casual underlying abnormality in the polycystic ovarian syndrome appears to be an abnormal pattern of gonadotropin secretion or imbalance of LH:FSH ratio.

It is hoped that the present study will provide a convenient experimental model for a more detailed investigation of the endocrine imbalance accompanying abnormal follicular development in the human.

Project No.	S-KU/Phys (23)
Project Title:	Spectroscopy of diatomic molecules
Name of Investigator:	Dr. M. Rafi
Project Particulars:	
-Duration	3 years
-Date of commencement	1-10-1978
-Date of completion	30-9-1981
-Implementing Agency	University of Karachi
-Total Expenditure	Rs.2,83,090/-

Main objectives:

To investigate the following aspects in diatomic molecules:-

- i) Analysis of P-complex of BaH & BaD.
- ii) Spectrum of AlH.
- iii) System of srH.
- iv) Potential curves of experimentally determined states of hydrides of groups of elements.
- v) Building of king-type furnace; formation of deuterium by electrolysis of heavy water; setting up a still powerful background source (Xe arc 900 W); replacing the present grating by a high angle blazed grating in Eoert mounting to obtain high resolution designing a suitable pre-disperser to select the desired order and an able comparator all combined together will help undertaking studies on (i) nd complex in absorption (ii) 5d complex in absorption at 2475 Å and (iii) 7P and 6d complex for srH in absorption with suitable experimental conditions.

Summary of the Work Done

The electronic spectra of various diatomic molecules has been studied to obtain various parameters which describe the structure of the molecules. A high pressure xenon (45 OW) has been set up and successful studies has been made of the BAH, SrH, Na₂ and LiH molecules. The spectra of BaH in uv has been recorded and similar conditions are needed in recording the spectra of CaH and SrH in uv region.

The hollow cathode Fe and N₂ source has been acquired and used to establish the ion standards in various regions. Two types of furnaces have been used, a resistance furnace and a king type furnace.

The experiments in absorption were performed on LiH and BaH in ultra violet region. The spectrum of HaH is quite significant in many respects. A new band of BaH has been observed in absorption at 2800 Å by using a 21ft. concave grating spectrograph. The spectrum of AIH at 3632 Å has been observed in emission using aluminium arc at low pressure in a atmosphere of hydrogen and information regarding the constants of the newly determined basis has been established.

Publication as a result of these Investigations

Khan, Iqbal A, Rafi, M. and Khan, M. Aslam	1979	Spectrum of BaH and 3800°A IL NUOVO CIMENTO, 53B, 364, 1979
Rafi, M., Baig, M. A. and Qureshi, M.H.	1980	Spectrum of AIH at 3632°A IL NUOVO CIMENTO, 56A, 289, 1980.
Rafi, M. and Khan, M. Aslam		Spectrum of SrH at 2620°A Ind. J. Phys. (in press).
Rafi, M.	1981	Some new bands of A'3 systems of LiH in UV. presented at LAMP conference ICTP, TRIESTE, March 9, 1981.
Iqbal, Zafar and Rafi, M.		A' - X' system of LiH sub- mitted to IL NUOVO CIMENTO. Spectrum of Na at 2700 Å° (under preparation). Absorption spectrum of BaH in U.V. Region (under preparat- ion).

Project No:	C-QU/Phys (26)
Project Title:	Non Linear Wave propagation in Plasma.
Name of Investigator:	Dr. G. Murtaza
Project Particulars:	
-Duration	3 years
-Date of commencement	1-7-1978

-Date of completion 30-6-1981

-Total Expenditure Rs.70,984/-

Main Objectives:

The proposal aimed at developing the important field of plasma physics. It intended to investigate theoretically, some aspects of Non-Linear wave propagation in plasma and in turn possibly provide answer to the problems like:

- i) The health of plasma.
- ii) The confinement of plasma
- iii) The anomalous diffusion of plasma etc.

Summary of the Work Done

The research programme has been concentrated on non-linear effects in wave propagation, in particular on investigating various effects on the modulational instability of non-acoustic waves.

The ion acoustic waves and electron waves have been studied in different situations, such as

- i) Effect of ionic temperature.
- ii) In the presence of density gradient.
- iii) When the plasma is relativistic.
- iv) In the presence of external constant magnetic field.
- v) Effect of ionic temperature, when external constant magnetic field is present.
- vi) Electro waves in a magnetised plasma.

Publication as a result of these Investigations

Durani, I.R.; Murtaza, G., Rehman, H.U. and Azhar, I.A.	1979	Effect of ionic temperature on the Modulational
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		instability of Ion Acoustic waves in a collisionless plasma. Phys. of Fluids, 22 (4), 791 (1979).
Durrani, I.R. Murtaza, G. and Rehman, H.U.	1979	Modulational instability of Ion Acoustic waves in the presence of Density Gradients. Can. J. Phys., 57, 642 (1979).
Durrani, I.R. Murtaza, G. and Rehman, H.U.	1980	Modulational instability of non-linear wave propagation in relativistic plasma Plasma Physcis, 22, 719 (1980).
Murtaza, G. and Salahuddin, M.		Modulational Instability of Ion Acoustic wave in a magnetised plasma. Accepted in Plasma Physics.
Murtaza, G. and Salahuddin, M.	1981	Effect of Ionic temperature on the modulational instability of ion Acoustic waves in the presence of magnetic field. Phys. Letters, 86A, 473 (1981).
Murtaza, G. and Salahuddin M.		Electron waves in a magnetised plasma.

B) Second Annual Reports

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

<u>Project No.</u>	<u>Title of the Project</u>
P-PU/AGR (64)	Eco-physiological studies on some important weeds of wheat (Chenopodium albus, Asphodeuls tenuifolius and Eupharli heliosepoia).
S-KU/Bio (99)	Catalogue/records of the Karachi University Zoological Museum.
P-PU/Phys (11/1)	High energy Phenomenology.

P-PU/Bio (93)	Morphological and Metabolic Hazards of Chlorinated Insecticides on small Mammals in Pakistan.
P-NIAB/Envr (18)	Mutagenicity of children consumable.
P-PU/Chem (106)	Synthetic and catalytic aspects of new transition metal alkyls and aryls.

C) *First Annual Reports*

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

<u>Project No.</u>	<u>Title of the Project</u>
S-KU/Med (45)	Hammaglobin structural changes and their impact on functions.
S-KU/Phys (24)	Measurement of electrical conductivity of some solids at and below room temperature.
P-PMI/Med (53)	Role of calcium in Renal stone formation in Pakistan.
C-QU/Envr (22)	Biological control of termites with Pheramones and Pathogenic fungi.
S-KU/Ocean (4/1)	Shore Erosion studies of Pakistan coast in the vicinity of Karachi.
S-SU/Chem (116)	Application of volatile metal complexes of some new schiff basis.
F-AMC/Med (50)	Prevalance and prevention of Tuberculosis in children.
JPMC/Med (44)	Investigation on the therepeutic value of indigenous plants used in traditional medicine for the control of diabetes.
C-QU/Phys (36)	Some aspects of thermonuclear fusion.
P-MHL/Med (57)	Epidiomological study of the orbital Tumours in Mayo Hospital, Lahore.

C-NIL/Med (69)

Study of viral respiratory disease
in children in Rawalpindi/Islamabad.

C-IU/Chem (73/1)

Kinetic, electrochemical and optical
investigation of the herbicide methyl-
viologens (paraquat) and the related
compounds.

CHAPTER - 3

ORGANIZATION AND ADMINISTRATION

The ultimate organizational and administrative structure of the Foundation is given in the charts on page 58 and 59. The staff in position during the report period is as under:-

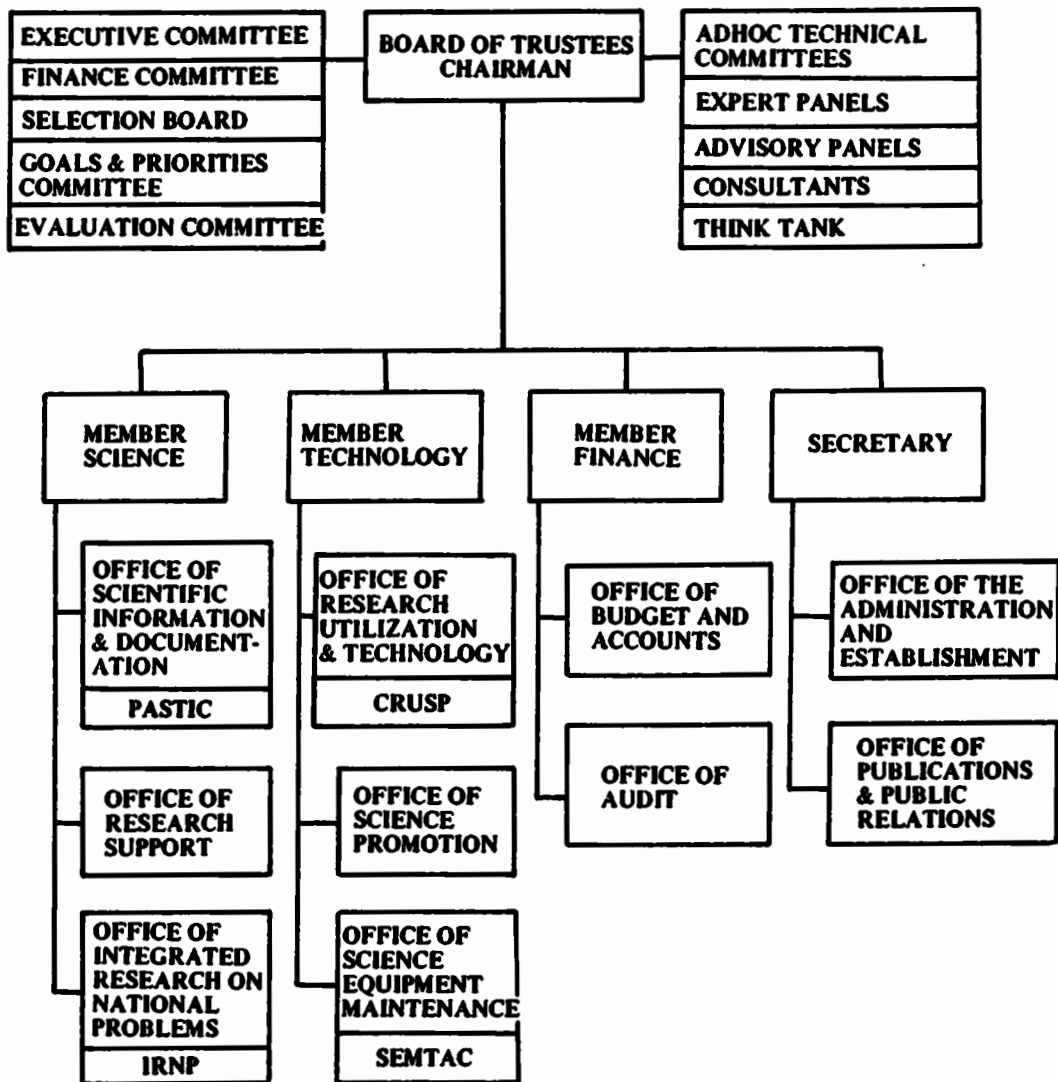
OFFICERS

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

17.	Superintendent	1
18.	Supporting Clerical Staff	40
		—
	Total	62

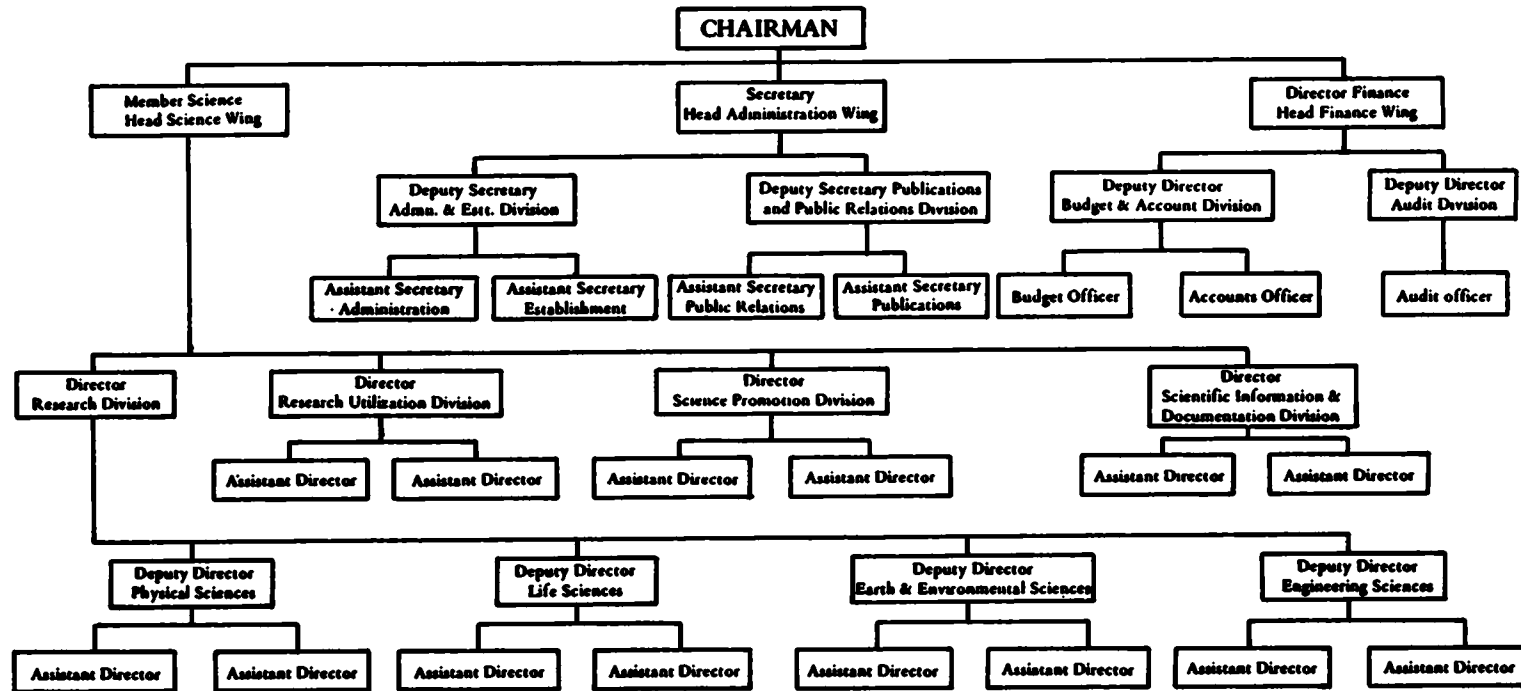
In addition to the whole-time Staff Members of the Foundation there are about 200 scientists and technologists in various universities/ research organizations who are acting in an honorary capacity as reviewers of the research proposals and members of the Technical Committees or Principal Investigators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

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
TELEPHONES: 64241
68154

December 31, 1984

1101

The Chairman
Board of Trustees
Pakistan Science Foundation
Islamabad.

Dear Sir,

PAKISTAN SCIENCE FOUNDATION
ACCOUNTS FOR THE YEAR ENDED JUNE 30, 1983

We enclose five copies of the balance sheet as at June 30, 1983 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 accruing 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 abandoned projects as at June 30, 1983.

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.123,686/- as at June 30, 1983 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.10,945 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 cycles and cars, the requirement specified in the Foundation's Rules related to the mortgage of the purchase vehicle to the Foundation and obtaining comprehensive insurance cover for it were not complied with.

3.2 Detailed fixed asset records are not maintained by the Foundation. We recommend that a 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 the 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 books. Alternately atleast a memorandum record is maintained of all such items.

3.4 We observed that the cost of UNESCO Coupons for the purchase of the scientific books, journals and other specified scientific equipment 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 assets 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, 1983 and the annexed receipts and expenditure account for the year ended June 30, 1983 and subject to the contents of our letter 1101 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, 1983 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 that there was no unspent balance after taking into consideration expenses incurred but not paid at June 30, 1983. However, refunds aggregating Rs.717,372 were received during the year related to grants disbursed during the year and in previous years (note 4 to the accounts), which refunds were not surrendered to the Federal Government upto the balance sheet date. We have also satisfied ourselves about the propriety of the disbursements made from the grant.

Sd/-

Chartered Accountants

RAWALPINDI

PAKISTAN SCIENCE FOUNDATION

BALANCE SHEET AT AT JUNE 30, 1983

FUNDS AND LIABILITIES	NOTE	1983 Rupees	1982 Rupees	PROPERTY AND ASSETS	NOTE	1983 Rupees	1982 Rupees
General Fund				Fixed assets	5	3,933,063	3,327,430
Opening balance		3,953,451	3,297,748	RESEARCH PROJECTS IN PROGRESS	2	33,551,078	29,881,506
Receipts and expenditure Account surplus for the year		636,807	664,171	CURRENT ASSETS			
		-----	-----	Sundry debtors		230,000	58,000
		4,590,258	3,961,919	Advances, deposits and prepayments	6	503,347	695,457
Less: Refund of unutilised grants disbursed during the year show under grants refundable to the Government (note 4)		63,443	8,468	Cash and bank balances	7	863,826	165,976
		-----	-----			-----	-----
		4,526,815	3,953,451			1,597,173	919,433
RESEARCH SUPPORT GRANTS	2	33,551,078	29,881,506				
CURRENT LIABILITIES							
For expenses	3	117,225	124,588				
Grants refundable to the Government	4	886,196	168,824				
		-----	-----				
		39,081,314	34,128,369			-----	-----
		=====	=====			39,081,314	34,128,369
						=====	=====

These accounts should be read in conjunction with the annexed notes

Chairman

Trustee

Trustee

**PAKISTAN SCIENCE FOUNDATION
RECEIPT AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED
JUNE 30, 1983**

	Note	1983 Rupees	1982 Rupees
Grants received		8,173,800	8,307,908
Less: Grants paid			
Research and Institutional support		3,669,572	4,604,485
Scientific societies and professional bodies		790,000	775,000
Scientific seminars & conferences		543,832	213,784
Travel grant for science		83,677	380,232
Conferences & Seminars			
Scientist pool subsistence allowance		3,000	194
Other functions	9	249,459	678
		<u>5,339,540</u>	<u>5,974,373</u>
		<u>2,834,260</u>	<u>2,333,535</u>
Administrative expenses	10	2,238,634	1,669,364
		<u>595,626</u>	<u>664,171</u>
Miscellaneous receipt	11	41,181	-
		<u>636,807</u>	<u>664,171</u>
		=====	=====

These accounts should be read in conjunction with annexed notes

Sd/- Chairman

Sd/- Trustee

Sd/- Trustee

**PAKISTAN SCIENCE FOUNDATION
NOTES TO THE ACCOUNTS FOR THE YEAR ENDED JUNE 30, 1983**

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. Fixed assets acquired for specific research projects are treated as research project expenditure.

1.3 Depreciation

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

	%
Furniture and fixture	6
Office equipment and airconditioners	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 account of the Foundation and have not been adjusted for completed projects.

3. Current liabilities

These consist of the following:-

Liabilities for expenses	1983 Rupees	1982 Rupees
Audit fee and expenses	62,500	42,500

Travel grants	26,165	
Salaries and other benefits	10,150	47,256
Honorarium		500
Other administrative expenses	18,410	34,332
	<u>117,225</u>	<u>124,588</u>
	=====	=====

4. Grants refundable to the Government

Balance brought forward	168,824	132,883
Amounts refunded during the year related to grants disbursed		
During the year	63,443	8,468
In prior years	653,929	27,473
	<u>717,372</u>	<u>35,941</u>
	<u>886,196</u>	<u>168,824</u>
	=====	=====

5. Fixed assets (See table on page 68)

6. Advances, deposits and prepayments

These are made up of

Advances to staff	74,003	8,887
Deposits	4,600	4,600
Prepayments	424,744	681,970
	<u>503,347</u>	<u>695,457</u>
	=====	=====

5. Fixed assets

	C O S T			D E P R E C I A T I O N		
	As at July 1, 1982	Additions/ deletion during the year	As at June 30, 1983	For the year	As at June 30, 1983	Written down value as at June 30, 1983
Leasehold land	2,960,253	53,666	3,013,919	--	--	3,013,919
Furniture & Fixture	218,456	126,097	344,553	16,188	90,938	253,615
Office equipment	205,016	161,255	366,271	38,833	146,218	220,053
Air conditioners	74,764	43,600	118,364	9,251	65,943	52,421
Motor vehicles	259,823	355,241	615,064	89,176	258,360*	356,704
Bicycles	680	--	680	69	401	279
Library books	9,912	31,269	41,181	1,898	5,109	36,072
Rupees	3,728,904	77,128	4,500,032	155,415	566,969	3,933,063
1982 Rupees	3,553,185	175,719	3,728,904	55,209	401,474	3,327,430

* Includes accumulated depreciation of Rs. 10,080 related to Suzuki van returned from National Science Council.

7.	Cash and bank balances		
	In hand	14,793	1,464
	With bank	849,033	164,512
		<u>863,826</u>	<u>165,976</u>
		=====	=====
8.	Research and institutional support		
	Maths and computing sciences	-	9,985
	Physical sciences	207,507	109,687
	Chemical Sciences	1,027,606	756,625
	Biological Sciences	388,788	487,685
	Earth Sciences	30,400	30,730
	Environmental Sciences	38,540	141,510
	Engineering Sciences	142,927	-
	Agricultural Sciences	172,951	155,649
	Medical Sciences	514,393	1,065,164
	<u>Institutional support</u>		
	Oceanography	1,122,000	1,842,000
	Utilisation	18,460	-
	Honoraria	5,900	5,450
		<u>3,669,572</u>	<u>4,604,485</u>
		=====	=====
9.	Other functions		
	Information & documentation	228,709	-
	Awards and prizes	20,750	

Scientific surveys and collection of statistics	-	150
Man and biosphere programme	-	528
	<u>249,459</u>	<u>678</u>
	=====	=====
10. Administrative expenses		
Salaries and other benefits	1,213,004	998,154
Travelling local	164,649	70,178
Office rental	213,600	145,502
Water,Electricity & Gas	31,270	29,291
Postage,Telephone & Telegrams	174,229	124,165
Printing and stationery	44,292	56,752
Vehicles running and maintenance	143,504	97,465
Newspaper and periodicals	12,258	7,867
Liveries and Uniforms	1,760	7,335
Entertainment	16,657	23,238
Repairs and maintenance	22,966	5,427
Depreciation	155,415	55,209
Miscellaneous expenses	23,664	14,519
	<u>2,217,268</u>	<u>1,635,102</u>
Audit fee	17,000	15,000
Advertisement	4,366	19,262
	<u>2,238,634</u>	<u>1,669,364</u>
	=====	=====

11. Miscellaneous receipts

This includes the written down value amounting to Rs.40,318 of one Suzuki Van returned from National Science Council and included in the fixed assets.

Sd/- Chairman

Sd/- Trustee

Sd/- Trustee

PAKISTAN SCIENCE FOUNDATION ACT 1973

National Assembly of Pakistan

Islamabad, the 2nd February, 1973

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

Act No.III of 1973

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

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

It is hereby enacted as follows:-

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

(2) It extends to the whole of Pakistan.

(3) It shall come into force at once.

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

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

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

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

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

(2) The Foundation shall be a body corporate by the name of the Pakistan Science Foundation, having perpetual succession

and a common seal, with power, subject to the provision of this Act, to acquire, hold and dispose of property, both movable and immovable, and shall by 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 processes found to be promising on a laboratory scale;
- (iv) the establishment of science centres, clubs, museums, herbaria and planetaria;
- (v) the promotion of scientific societies, associations and academies engaged in spreading the cause of scientific knowledge in general or in the pursuit of a specific scientific discipline of technology in particular;
- (vi) the organization of periodical science conferences, symposia and seminars;
- (vii) the exchange of visit of scientists and technologists with other countries;
- (viii) the grant of awards, prizes and fellowships to individuals engaged in developing processes, products and inventions of consequence to the economy of the country; and
- (ix) special scientific surveys not undertaken by any other organisation 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 assist them, in collaboration with concerned agencies, in finding appropriate employments; and
- (iii) establish liaison with similar bodies in other countries.

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

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

Whole-time members

- (i) the Chairman
- (ii) one eminent scientist;
- (iii) the Director of Finance;

to be appointed by the President;

Part time members

- (iv) the Chairman of the National Science Council;
- (v) four scientists to be nominated by the National Science Council; and
- (vi) eleven eminent scientists to be nominated by the President.

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

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

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 by the Chairman or, in his absence, by its whole-time scientist member.

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

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

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

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

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

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

- (a) grants made by the Federal Government and the Provincial Government;
- (b) donation and endowments; and
- (c) income from other sources.

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

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

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

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

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

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

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

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

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

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

LIST OF SANCTIONED RESEARCH GRANTS 1982-83

<u>S.No.</u>	<u>List of scheme</u>	<u>Amount sanctioned</u>	<u>Name of the Principal Investigator and Organization supported</u>
1. <u>Agricultural Sciences</u>			
	i) Utilization of indigenous research for introduction of game birds breeding in Pakistan P-CSIR/Agr (61)	2,08,936/-	Dr.F.H.Shah, Chief Scientific Officer, Food Technology & Fermentation Division
	ii) Development of Commercial Cotton Hybrid. S-PCCC/Agr (77)	1,59,554/-	Mr.Mohiuddin Ahmad, Senior Scientific Officer, Cotton Research Institute, Nawabshah.
2. <u>Biological Sciences</u>			
	i) Studies on the Taxonomy Ecology and Economic Importance of Acrididae (orthoptera), of Sind. S-SU/Bio (115)	83,664/-	Dr. Muhammad Saeed Wagan, Department of Zoology, University of Sind, Jamshoro.
	ii) Chemotaxonomic studies in Angiosperms (from Pakistan) with reference to Phenolics. S-KU/Bio (116)	2,22,643/-	Dr.Khadija Aziz, Assistant Professor, Department of Botany, University of Karachi Karachi-32.
	iii) Biology of Bellamaya bengalensis (Lamerck) with special reference to its reaction to other molluscs and digenetic, trematode Parasites. P-PU/Bio (117)	2,72,785/-	Dr. Daler Khan, Chairman, Department of Zoology, University of Punjab, Lahore.
	iv) Studies on incidence taxonomy and seasonal variations of ecto and endo Parasites of wild birds in Sind. S-AU/Bio (126)	1,57,498/-	Dr.Shah Nawaz Buriro, Professor, Department of Parasitology Sind Agriculture University, Tandojam.

- v) Proposal for preparation of book on Medicinal Plants of Pakistan. P-PU/Bio (126) 1,32,902/- Dr. Abdul Hamid, Rt. Director, Advance Studies & Research University of Agriculture, Faisalabad.
3. Chemical Sciences
- i) Studies on the food potential of indigenous algae. S-CSIR/Chem (118) 1,48,720/- Dr. Amanullah Shah, University of Engineering & Technology, Lahore.
- ii) Studies on Plants of Medicinal and Nutritive value. S-CSIR/Chem (129) 1,05,249/- Dr. S.A. Warsi, PCSIR Laboratories, Karachi.
- iii) Investigation of Reactivity of Phosphate Esters. P-PU/Chem (130) 96,040/- Dr. Muhammad Younas, Associate Professor, Institute of Chemistry, University of Punjab, Lahore.
- iv) Catalytic Production of Industrial solvents from natural gas. P-GSL/Chem (131) 1,86,800/- Lt.Col.Abdul Hamid, GHQ Science Laboratory Chaklala, Rawalpindi.
- v) A study of Acetylcholinesterase in Erythrocytes. F-PU/Chem (137) 50,830/- Mr.S.Fazli Mabood, Assistant Professor, Department of Chemistry, Quaid-i-Azam University, Islamabad.
- vi) Polymerization and Electron Transfer Process, studies on substituted Ethylenes 2,36,850/- Dr.Mahboob Mohammad, Department of Chemistry, Quaid-i-Azam University, Islamabad.
- vii) Pollution control studies on water in the Public Utility and industry in Pakistan C-QU/Chem (138) 93,840/- Dr.M. Arsalan, Assistant Professor, Department of Chemistry, University of Peshawar, Peshawar.

- viii) Studies for Industrial exploitation of Nagar Parkar China Clay. P-CSIR/Chem (140) 2,54,388/- Dr. F. A. Faruqi, Chief, Scientific Officer, O/I Glass & Ceramics Division, PCSIR Laboratories, Lahore.
4. Earth Sciences:
- Geochemistry and Minerology of Sardhai formation and related Rocks of the salt range Punjab. P-PU/Earth (24/1) 1,86,262/- Prof. F. A. Shams, Institute of Geology, University of Punjab, Lahore.
5. Engineering Sciences
- Ground water Management model of SCARP-II. P-UET/Engg (17) 1,79,400/- Dr.N.M. Awan, Director, Centre of Excellence in Water Resources Engineering University of Engineering & Technology, Lahore.
6. Medical Sciences
- i) Modified Tarbeculectomy Operation for Chronic simple Glaucoma. P-PMI/Med (86) 79,595/- Dr.Nazir Ahmad Malik, Post-Graduate Medical Institute, Lahore.
- ii) Comparative study of Tru-Cut needle biopsy in the diagnostic evaluation of breast masses. P-SGR/Med (87) 1,05,180/- Prof. Khalida Usmani, Professor of Surgery, Fatima Jinnah Medical College, Lahore.
- iii) Use of Carcino Embryonic Antigenes for cancer diagnosis C-QU/Med (88) 1,93,220/- Dr. M. Arslan, Professor & Chairman, Department of Biology, Quaid-i-Azam University, Islamabad.
- iv) Biochemistry of Gall bladder Mucin and Glycoproteins. B-BU/Med (93) 3,47,800/- Dr.Nasir-ud-Din, Professor, Department of Biochemistry of Baluchistan Quetta.
- v) Biochemistry of 6,01,587/- Dr.Nasir-ud-Din, Professor,

Normal Asthmatic
and Bronchitic
lung Mucus.
B-Bu/Med (93)

Department of Bio-
chemistry of Baluchistan
Quetta.

7. Physical Sciences

High Energy Pheno-
menology
F-FU/Phys (11/2)

2,63,000/-

Dr. Mohammad Saleem,
Department of Physics,
University of Punjab,
Lahore.

Annexure-III

PSF GRANTS GIVEN AS INSTITUTIONAL SUPPORT

<u>S.No.</u>	<u>Institution</u>	<u>Grant in Rupees</u>
1.	Pakistan Museum of Natural History, Islamabad.	60,000/-
2.	University of Punjab, Lahore	1,00,000/-
3.	Mehran University of Engineering & Technology, Jamshoro.	15,000/-
4.	N.W.F.P. Agriculture University, Peshawar	1,00,000/-
5.	University of Karachi	2,10,000/-
6.	Mehran University of Engineering & Technology, Jamshoro.	1,00,000/-
7.	University of Karachi	3,00,000/-
8.	University of Agriculture, Faisalabad	1,20,000/-
9.	Pakistan Museum of Natural History, Islamabad.	50,000/-
10.	University of Baluchistan, Quetta	30,000/-
11.	University of Agriculture, Faisalabad.	10,000/-
12.	University of Punjab, Lahore	25,000/-
13.	Govt. High School, Ghaziabad.	2,000/-

**GRANTS SANCTIONED FOR SCIENTIFIC SOCIETIES AND
LEARNED BODIES FOR ACHIEVEMENT OF THEIR OBJECTIVES**

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

GRANTS SANCTIONED FOR PUBLICATION PROGRAMME

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

13. Khyber Medical College Peshawar	Pakistan Oral & Dental Journal	10,000/-
14. National Science Council	Journal "Science Technology & Development."	50,000/-
15. University of Karachi	Journal of Pharmacy	20,000/-
16. Federal Government Urdu	'Tahqeeq'	12,000/-
17. Society for the Promotion of Engineering Education	Journal of Engineering Education	10,000/-

**GRANTS SANCTIONED FOR ORGANIZING
SCIENCE CONFERENCE/SYMPOSIA/SEMINAR**

<u>S.No.</u>	<u>Agency</u>	<u>Object</u>	<u>Amount sanctioned</u>
1.	Board of Intermediate & Secondary Education Lahore.	Summer School for Talented Students of Intermediate & Secondary Education.	20,000/-
2.	University of Karachi, Karachi.	National Symposium on the role of Universities in improving the Scientific Education & Research.	10,000/-
3.	University of Peshawar Peshawar	1st Polymer Science Symposium.	20,000/-
4.	Univeristy of Karachi, Karachi.	1st International Symposium on "The Chemistry of National Products."	30,000/-
5.	Quaid-i-Azam University, Islamabad.	Conference on Industrial uses of Electrochemistry.	20,000/-
6.	University of Agriculture, Faisalabad.	Seminars in connection with "Centenary celebrations of College of Veterinary Sciences Lahore."	20,000/-
7.	PCSIR Laboratories, Lahore.	Ten Days Training Course on Plant Nematology	14,885/-
8.	University of Agriculture, Faisalabad.	3rd Annual Zoological Congress.	25,000/-
9.	Islamia University, Bahawalpur.	21st All Pakistan Urdu Science Conference.	50,000/-
10.	Ministry of Science & Technology, Islamabd.	International Symposium/ Workshop on Renewable Energy Sources.	1,00,000/-

11. College of Physicians & Surgeons, Pakistan, Quetta.	International Conference of Pakistan Dental Surgeons.	30,000/-
12. University of Peshawar, Peshawar	National Symposium on Resources and Development in Karakorum Himalyas (Northern Area of Pakistan).	25,000/-
13. Ministry of Science & Technology, Islamabad.	1st Meeting of the OIC standing Committee on scientific and technical cooperation.	50,000/-
		<hr/> 4,14,885/- <hr/>

TRAVEL GRANTS FOR VISITS ABROAD

<u>S.No.</u>	<u>Name and Address</u>	<u>Conference/Seminar</u>	<u>Amount sanctioned</u>
1.	Mr. Abdul Aziz Sabir, Assistant Professor, Deptt. of Mathematics and Statistics, University of Agriculture, Faisalabad.	Ist Saudi Symposium on Statistics and its application held in Riyadh, Saudi.	Rs.18,955/- (Not availed)
2..	Mr. Abdul Samad Harai, Professor and Director, Institute of Statistics, University of Punjab, Lahore.	Ist Saudi Symposium on Statistics and its application held in Riydh, Saudi Arabia.	Rs.7,414/- (Not availed)