ANNUAL REPORT

PAKISTAN SCIENCE FOUNDATION

1990-91

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PAKISTAN SCIENCE FOUNDATION
CONSTITUTION AVENUE ISLAMABAD

LETTER OF TRANSMITTAL

Dear Mr. Secretary

I have the honour to enclose herewith the Annual Report of the Pakistan Science Foundation for the Fiscal Year 1990-91, alongwith its audited accunts, as adopted by PSF Board of Trustees for submission to the National Assembly as required by the Pakistan Science Foundation's Act No. III of 1973.

With regards

Yours sincerely,

Dr. Bashir Ahmed Sheikh
Chairman
Pakistan Science Foundation
Islamabad.

Secretary,
Ministry of Science and Technology
Government of Pakistan
ISLAMABAD

PAKISTAN SCIENCE FOUNDATION

CHAIRMAN

Dr. Bashir Ahmed Sheikh, M.Sc. (Hons) Physiology and Pharmacology, Ph.D. (Physiology) Iowa State University, Ames, Iowa, USA.

EXECUTIVE COMMITTEE

Dr. Bashir Ahmed Sheikh	Chairman
Vacant	Member Science
Mr. Jaffar Shah Mohmand	Member Finance

BOARD OF TRUSTEES

Three whole-time Members appointed by the President:

1.	Dr. Bashir Ahmed Sheikh	Chairman
2.	Vacant	Member Science
3.	Mr. Jaffar Shah Mohmand	Member Finance

Sixteen part-time Members appointed as follows:

4. Chairman, Pakistan Council for Science & Technology, Islamabad.
5. Dr. Naeem Ahmed Khan, House No.9, Street No. 11, F-7/2, Islamabad.
6. Lt. Gen. M.A.Z. Mohydin, House No. 16, opposite APWA College, Jail Road, Lahore.
7 Dr. S. Ahmed Hasnain, Director General, National Institute of Electronics, Islamabad.
8. Dr. A.Q. Alvi, Chairman, Council for Works & Housing Research, Karachi.
9. Mr. M. Masihuddin, Secretary, Ministry of Production, Government of Pakistan, Islamabad.
10. Dr. M. Raziuddin Siddiqui, Fellow, Pakistan Academy of Sciences, Islamabad.
11. Dr. A.Q. Ansari, Chairman, University Grants Commission, Islamabad.
12. Dr. Ishfaq Ahmed, Senior Member, Pakistan Atomic Energy Commission, Islamabad.
13. Dr. M.H. Qazi, Vice Chancellor, Allama Iqbal Open University, Islamabad.
14. Prof. Dr. R.A.K. Tahirkheli, Director, Center of Excellence in Geology, University of Peshawar, Peshawar.
15. Prof. Dr. Jameel Ahmed Khan, Vice Chancellor, NED University of Engineering and Technology, Karachi.

16. Lt. Gen. Syed Azhar Ahmad, Executive Director, National Institute of Health, Islamabad.
17. Dr. Amir Muhammad, Chairman, Pakistan Agricultural Research Council, Islamabad.
18. Prof. Dr. H.A. Kazmi, Whole-Time Member, University Grants Commission, Islamabad.
19. Mr. Abdul Raziq Khan, Secretary, Department of Irrigation and Power, Government of Balochistan, Quetta.

CONTENTS

ABBREVIATIONS

Province

B	Balochistan
C	Centre
F	Frontier
P	Punjab
S	Sindh
AJK	Azad Jammu and Kashmir

Sponsoring Institutions

AC	Agricultural College
AU	Agricultural University
EU	Engineering University
QU	Quaid-i-Azam University
KU	Karachi University
GU	Gomal University
PU	Peshawar University/Punjab University
SU	Sindh University
BZU	Bahauddin Zakariya University
UCR	University College, Rawlakot
CSIR	Council of Scientific and Industrial Research
JPMC	Jinnah Post-Graduate Medical Centre
NIAB	Nuclear Institute for Agriculture and Biology
GSP	Geological Survey of Pakistan

Disciplines

AGR	Agricultural Sciences
BIO	Biological Sciences
ENG	Engineering Sciences
MED	Medical Sciences
PHYS	Physical Sciences
CHEM	Chemical Sciences
MATH	Mathematical Sciences
EARTH	Earth Sciences
ENVR	Environmental Sciences

EXECUTIVE SUMMARY

PAKISTAN SCIENCE FOUNDATION (PSF)

Pakistan Science Foundation (PSF) is an apex body for promotion and funding of scientific and technological activities in the country. The activities undertaken by the Foundation for the performance of its statutory functions are divided into three broad categories:

i) To promote basic and fundamental research in universities and research institutes on scientific problems related to socio-economic needs/development of the country.

ii) To increase public awareness about science through science promotion activities by establishing museums, clubs, herbaria and planetaria etc.

iii) To establish centers for comprehensive scientific and technological information systems.

The activities of the Foundation revolve around these objectives. The first function is carried out by the Science Wing of PSF while the second one is achieved through Science Promotion Section of PSF and Pakistan Museum of Natural History (PMNH) and the third through Pakistan Scientific and Technological Information Centre (PASTIC). The activites during the year are reflected below.

RESEARCH SUPPORT:

Research Support is the principal programme of the Foundation for promotion of basic and fundamental research relevant to the socio-economic needs of the country. During the period under report, a total of 134 projects were under consideration of the Foundation. Among these, 58 were newly received, whereas 76 project proposals were carried over from the previous year. During the report period, 27 research projects were sanctioned at a total cost of Rs. 6.34 million in the fields of agricultural, biological, chemical, earth, medical, and physical sciences.

During the report period 45 technical reports including semi-annual and annual reports were received and assessed. Some 13 projects completed during the year and their final reports were received. The completed projects/studies were in different disciplines as under.

- Studies on the stability of hybrid plasmids carrying segments of *Bacillus subtilis in E.coli*
- Parasitic survey of wild birds in the province of Balochistan.
- Guide to the Malacostraca of the Northern Arabian Sea
- Chemistry and bio-chemistry of glycoprotein sulfotransfereases and sulphate acceptors
- Amino acid sequence study on hemoglobin and venom from snakes found in Pakistan
- Biosynthesis of antibiotic bacitracin by *Bacillus dicheniformis* as supplement in poultry feed
- Geochemistry and mineralogy of Sardhi formation and related rocks of the salt range, Punjab
- Study of properties of BCK and BCI algebra and their categorical aspects.
- Studies on protein changes in senile cataract
- Use of leu-M, monoclonal antibody for the diagnosis of Hodg kins disease.
- Feasibility studies for the extraction of energy from currents and helio hydro-gravity along Pakistani coast.
- Electronic spectroscopy of molecules.
- Atomic photo absorption spectroscopy at high resolution.

In addition to regular meetings of various Technical Committees of PSF, special meetings were also held to identify priority areas in biological and chemical sciences.

For strengthening of institutions, an amount of more than Rs. 0.367 million was released to five organizations as institutional support grants for purchase of laboratory equipment and materials. This activity is much emphasized upon because in most institutions the major machinery is often available but they do not have the accessories to operate the machines.

The Foundation gives annual grants to the established learned bodies and scientific societies, as partial financial assistance for the achievement of their approved objectives and publication of their respective scientific journals. Annual grants amounting to Rs. 0.500 million were released to 12 Societies and 9 Journals during 1990-91.

Travel grant requests from 49 scientists were received during the year, out of which 16 were sanctioned to facilitate the scientists to present their research papers in the International Seminars/Symposia. However, only six scientists were able to avail the grants. The remaining could not avail PSF grants owing to difficulties in getting clearance due to Government ban on travel abroad of scientists.

As a regular feature, PSF encourages higher education in the country through award of fellowships to deserving outstanding students. During 1990-91, an amount of Rs. 24,000/- was released on account of one Ph.D. and three M.Phil Fellowships to Quaid-i-Azam University, Islamabad and Balochistan University, Quetta.

SCIENCE POPULARIZATION

Pakistan Science Foundation puts great emphasis on promotion of science and increasing the awareness of people about the scientific developments in the world. One of its main activities for the purpose is the funding of science conferences, seminars, symposia and training courses etc. During the year, Rs. 4,20,000/- was granted to various scientific institutions/organizations for holding conferences, seminars, symposia, workshops, etc.

Financial as well as organizational support was extended to the Board of Intermediate and Secondary Education (BISE) Quetta for arranging the 9th Science Exhibition. Similarly, a grant of Rs. 30,000/- was provided to BISE Lahore for organizing the 7th Summer School at Khanspur.

Arranging popular science lectures on scientific themes is a regular activity of the Foundation. During the report period, the following three lectures were arranged at PSF auditorium:

- "Skeletal Muscle Transplantation" by Dr. Shahzad A. Mufti, Director General, PMNH.

- "Drug Disposition in the Body" by Dr. Mohammad Nawaz, Associate Professor, University of Agriculture, Faisalabad.

- "Possibilities of Uniform Lunar Calendar for Muslim World" by Dr. M. M. Qureshi, Secretary General, Pakistan Academy of Sciences.

The Foundation continued arranging the science film/planetarium shows in educational institutions. During the year, 253 film shows and 308 planetarium shows in boys and girls schools were arranged. Thirteen 16mm documentary films on popular science themes were also purchased from MMI Corporation/Britannica Films for showing in the schools. A science slide show program having 90 slides on such topics as "extinct animals, heavenly bodies, etc., have also been prepared.

For the promotion and popularization of science at the gross root level, the PSF has been encouraging establishment of science clubs in schools all over the country. So far, 234 science clubs have been registered with the Foundation and have been provided with a booklet, "Science Project for High Schools" along with Rs. 500/- each for purchase of experimental materials. The clubs were also provided with 30 other scientific books.

A quarterly "Science Bulletin" based on news and views on everyday science issues was also launched during the year. The bulletin is distributed to various educational and research institutions free of cost.

For promotion of computer education, PSF awarded Rs. 10,000/- to Fazle Haq College, Mardan, as being the best school/team working on computers.

Publication of science posters, Intra and Inter-Board science poster contests and Intra-Board essay contest are regular activities of PSF. During the report period, the 4th set of 10 posters was printed and sent to 6000 high schools and many R & D organizations. Also, the 3rd science poster contest and 2nd essay competition were held and the winners awarded with cash prizes and shields.

Science Caravan, the Mobile Science Exhibition is the PSF's main tool for promotion of science in the rural areas of Pakistan. During the year, the three caravan units, viz.; Federal, NWFP and Sindh visited various schools and arranged exhibitions. However, the Sindh unit could not visit a number of places due to law and order situation in the province.

INTERNATIONAL LIAISON

A two member delegation, comprising Chief Scientific Officer of the Foundation and Deputy Scientific Adviser of the Ministry of Science & Technology, visited National Science Foundation of China for a period of one week in September 1990 to see the working of the Chinese Science Foundation and implementation of its research projects in various universities under the 10th S&T protocol between the Government of Islamic Republic of Pakistan and the Peoples Republic of China.

To reciprocate this visit a three member delegation from National Natural Science Foundation of China (NSFC) visited Pakistan in June, 1991. The visit was aimed at establishing an active liaison with Pakistan Science Foundation for promoting collaborative research between the universities and research institutions of the two countries. The Chairman, Pakistan Science Foundation paid a one week visit to U.K. under MOU with Royal Society, London. The visit was aimed at discussion for renewal of the MOU and exploring possibilities of collaboration with Royal Society and British Science Museum.

The Principal Scientific Officer of PSF, Dr. Fauzia Iqbal attended a UNDP project meeting in Manila, Philippines and presented the country paper.

PAKISTAN MUSEUM OF NATURAL HISTORY (PMNH)

Pakistan Museum of Natural History located at Islamabad is the research organ of PSF and was established in 1979 to enhance public understanding of science and natural resources. Its main objective is to serve the national needs in the vitally important areas of research, conservation and education involving Pakistan's heritage of natural resources. The Museum is a national repository for permanent storage of plants, animals, rocks, minerals and fossils of the country.

PMNH has four divisions, viz., Botanical Sciences, Zoological Sciences, Earth Sciences and the Public Service Division. The four divisions of PMNH remained actively engaged in their assigned programs during the year. PMNH kept itself involved in building up a comprehensive reference collection in sections and took part in different scientific expeditions independently as well as in collaboration with other national and international organizations. As a result of these endeavors, PMNH was able to publish a number of research articles in scientific national and international journals. Moreover, the Museum is now publishing its own bulletin entitled "Natural History Bulletin".

Public Services Division of PMNH remained busy in promoting public awareness about different scientific concepts and problems of national concern, through well planned exhibits. This division also organized guided trips to main Museum Display Center, the Laboratories and Marghazar Display Corner, and showed various scientific films regularly to the visitors to enhance their knowledge, arouse their curiosity and awaken their creative spirit.

PMNH continued its national and international liaison and work on the establishment of a natural history section at National Museum of Science and Technology, Lahore continued during the year under review. While scientists from Japan, USA and England worked on various scientific projects with their counterparts at the Museum laboratories.

PAKISTAN SCIENTIFIC AND TECHNOLOGICAL INFORMATION CENTRE (PASTIC)

PASTIC is one of the organs of PSF established to undertake the establishment of comprehensive scientific and technological information and dissemination centers with the following objectives.

1. To collect, organize, classify and disseminate information in all disciplines of Science and Technology to scientific community of Pakistan.
2. To develop inter-library cooperation for sharing resources.
3. To establish and maintain links with international/regional information networks/agencies.
4. To train information specialists in modern information handling and management techniques.
5. To develop and strengthen the National Science Reference Library.
6. To collect data on S&T information.

During the report period, 2079 requests for supply of articles were received out of which 1387 were honored including 308 from foreign sources. Some 30 bibliographies and two issues of Environment News were also prepared and supplied to the clients.

Four issues of Pakistan Science Abstracts were published based on recent research articles published in various Pakistani S&T journals. Bibliographic data on 735 documents was computerized and 946 library users were supplied references.

Information to various S & T organizations including WAPDA, Planning Division and PCRWR was provided on wildlife conservation strategy, and water supply and sanitation.

PASTIC organized two training courses on computer software and CDS/ISIS at Karachi and Islamabad during 1990-91.

PASTIC undertook 54 printing jobs for eleven S & T organizations during the report period. The monthly bulletin "Technology Information" was also produced on the basis of various technologies collected from 27 countries. The bulletin was mailed to 215 industrial and technical enterprises in public and private sectors

Technological information promotion system (TIPS) based at PASTIC has been regularly publishing daily and weekly bulletins in Pakistan which provide up-to-the-minute and detailed information on technology and trade opportunities. It covers fourteen different sectors and has the largest data base in the world on trade/technology information from the developing countries.
The sectors are:-

(i)	Agro-Industries	(viii)	Biotechnology
(ii)	Energy	(ix)	Textiles
(iii)	Electronics	(x)	Fisheries
(iv)	Pharmaceuticals	(xi)	Building Materials
(v)	Business Opportunities	(xii)	Chemicals
(vi)	Food Processing	(xiii)	Mining
(vii)	Machinery	(xiv)	Packaging

During the period, 1920 technology/trade offers and requests came from 10 countries and were sent to 450 users in Pakistan. Pakistani enterprenuers/business organisations submitted information on 780 products/processes/technologies which were advertised abroad through TIPS network.

INTRODUCTION

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

I. establishment of comprehensive scientific and technological information and dissemination centers;

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

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

IV. establishment of science centers, clubs, museums, herbaria and planetaria;

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

VI. organization of periodical science conferences, symposia and seminars;

VII. exchange of visits of scientists and technologists with other countries;

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

IX. special scientific surveys not undertaken by any other organization and collection of scientific statistics related to the scientific efforts of the country.

The Foundation shall also:-

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

ii. maintain a National Register of highly qualified and talented scientists/ engineers and doctors both in and outside Pakistan, and to assist them in collaboration with concerned agencies to seek appropriate employment; and

iii. establish liaison with similar bodies in other countries.

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

CHAPTER- 1

ACTIVITIES & PROGRAMS

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

- Establish comprehensive scientific & technological information and dissemination centers.
- Promote and finance scientific research in the country and the utilization of the research results.
- Promote and popularize science in society.
- International Liaison.

The first activity is carried out through Pakistan Scientific and Technological Information Centre (PASTIC), a subsidiary organization of PSF. The other functions i.e. research support, science popularization etc. are performed by the Science Wing of the Foundation and the Pakistan Museum of Natural History (PMNH). The Science Wing of the Foundation is divided into two sub sections as under:-

(A) Research Support Section, which performs the following activities.

1. Research support.
    a. Grant of research projects to individual researchers.
    b. Institutional support.
2. Research evaluation.
3. Support to scientific societies/learned bodies.
4. Exchange of visits.
5. Awards and fellowships.
6. Survey and statistics.
7. Scientists pool.
8. International liaison.
9. Other activities.

(B) Science Popularization Section, the section carries the following activities;

1. Funding for conferences, symposia, seminars, workshops.
2. Organization of science exhibitions/fairs.
3. Popular science lectures.

4. Arranging film/planetarium & slide shows.
5. Distribution of scientific books & magazines.
6. Science promotion through press & publications.
7. Science posters.
8. Promotion of science in rural areas (Science Caravans).
9. Establishment of science centers, clubs, etc.

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

The progress of the work carried out by the science sections of the Foundation, PMNH and PASTIC during the year 1990-91 is summarized in the following pages.

PAKISTAN SCIENCE FOUNDATION

A. RESEARCH SUPPORT SECTION

The progress of the work done by the Research Support Section during the year, 1990-91 under various statutory functions entrusted to it, is summarized below.

1. RESEARCH SUPPORT

The promotion of basic and fundamental research in universities and other institutions on scientific problems relevant to the socio-economic development of country is an important function of PSF. The research support activities are carried out through following programs:-

i) Grants for research projects submitted by individuals and groups of scientists in universities and research institutions in the country.

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

iii) Support for participation in regional and international research programs.

a) Grants of Research Projects

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

During the period under report, 58 new projects were received by the Foundation, whereas 76 projects proposals which had been at various stages of their processing, were carried over from the previous year. Thus, in all, 134 proposals remained under active consideration of the Foundation during the period 1990-91. The proposals were examined by the experts in relevant fields in the light of their scientific merit and according to the criteria laid own by the Foundation. The criteria for research funding are: (a) competence of the scientific personnel to carry out the research; (b) institutional capability i.e. availability of requisite equipment, laboratory and literature facilities; (c) scientific merit of the proposed research; and (d) likelihood of completion of the project within the stipulated time. Each proposal after receipt of the initial review report, is placed before the relevant Technical Committee for technical evaluation and Executive Committee of the Foundation for final sanction.

During the report period 27 projects were sanctioned at an estimated cost of Rs. 6.340 million. The 1st instalments of the projects amounting to Rs. 3.30 million have been released for initiation of work. Following were the newly sanctioned projects.

Title of Schemes:	Name of P.I. & Organization supported	Project cost:
AGRICULTURAL SCIENCES		
Development of Short Statured Varieties of Basmati Rice. P-NIAB/AGR (97)	Mr. Mohammad Afsar Awan, Nuclear Institute for Agriculture and Biology, (NIAB), Faisalabad.	Rs. 2,12,807/70
Isolation & Typing of Various Strains of Streptococcus Thermophilus & Lactobacillus Bugaricus from local Dahi: Samples & their Effect on various physio-chemical properties of Milk during fermentation. F-AU/AGR(106)	Mohammad Akbar Arain, Assistant Professor, Department of Dairy Technology, Faculty of Animal Husbandry & Veterinary Sciences, Sindh Agriculture University, TandoJam	Rs. 68,350/-
Effects of Foliar Application of Micro-nutrients in Combination of Urea on Yield & Fruit Quality of Sweet Oranges. F-AU/AGR (107)	Prof. Jehanagir Khan Khattak Department of Soil Science, NWFP Agricultural University, Peshawar.	Rs. 2,79,700/-
Utilization of Salt Affected Soils. F-GU/AGR (109)	Dr. Akhtar Nawaz Khan, Associate Professor, Faculty of Agriculture, Gomal University, D.I.Khan.	Rs. 3,56,900 -
BIOLOGICAL SCIENCES		
Termites of Desert Zones of Pakistan. P-PU/BIO (172)	Prof. Dr. M Saeed Akhtar, Department of Zoology, University of Punjab, Lahore.	Rs. 2,31, 142/-

Study of the Effect of Seasonal Variation on the Energetic of Body Composition & Energy Budget Parameters of the Culturable Fish Varieties of Multan Division. P-BZU/Bio (176)	Dr. Abdus Salam, Assistant Professor, Institute of Pure & Applied Biology, Bahauddin Zakariya University, Multan.	Rs. 1,49,800/-
Exploratory Survey of Nodulated Wild Plants Carrying on Atmospheric Nitrogen Fixation in Forest Area of District Poonch A.J.K. AJK-UCR/BIO(178)	Dr. M Farhat Ali Khan, Professor, University College of Agriculture, Rawlakot, Azad Kashmir.	Rs. 61,916/-
Management Biology of Houbara in Punjab. P-BZU/BIO (180)	Mr. Afsar Mian, Assistant Professor, Institute of Pure & Applied Biology, Bahauddin Zakariya, University, Multan.	Rs. 1,62,800/-
Systematic Distribution of the Flavonoids in Papilionidenae. S-KU/BIO (181)	Dr. Khadija Aziz, Assistant Professor, Department of Botany, University of Karachi, Karachi.	Rs. 1,71,000/-
Echinoderm Fauna of Karachi (Sindh Coast), Pakistan. S-KU/BIO (183)	Dr. Nasima N. Tirmizi, Director, Marine Reference Collection Center, University of Karachi, Karachi.	Rs. 96,000/-

CHEMICAL SCIENCES:

Effect of Municipal Sewerage & Industrial Effluents on the Quality of Phulaili Canal Water. S-SU/CHEM (200)	Dr. M.Y. Khuhawar, Associate Professor, Institute of Chemistry, University of Sindh, Jamshoro.	Rs. 91,100/-
Liquefaction Studies of Pakistani Coal. S-	Dr. Missbah-ul-Hassan, Principal Scientific Officer, Fuel	Rs. 90,100/-

CSIR/CHEM (201)	Research Center, PCSIR Labs. Karachi.	
Synthesis & Application of Organotin Compounds for Pest and Disease Control. C-QU/CHEM(204)	Dr. Saqib Ali, Assistant Professor, Department of Chemistry, Quaid-i-Azam University, Islamabad.	Rs. 92,100/-
Evaluation of Trace elements and Aerosols in air and their Effects on Urban Environment of Punjab Area in Pakistan. P-PU/Chem (208)	Dr. M. Zafar Iqbal, Professor/Director, Institute of Chemistry, Punjab University, Lahore.	Rs. 2,86,500/-
EARTH SCIENCES:		
Stratigraphic Analysis of Mesozoic(Jurassic Upwards) and Paleogene Rocks of Hazara, Azad Kashmir & Adjacent Areas of Rawalpindi & Islamabad Districts & Variations in Khhat-Potwar Province of Indus Basin. P-PU/Earth (32/1)	Dr. M.A. Latif, Professor Institute of Geology, University of Punjab, New Campus, Lahore.	Rs. 1,57, 279/-
Environmental Geology & Aggregate Resources of Karachi Region. S-KU/Earth (42)	Dr. S.I. Mohsin, Professor, Department of Geology, University of Karachi, Karachi.	Rs. 3,97,600/-
Mineral Wealth of Pakistan. C-GSP/Earth (43)	Mr. Asrarullah, Ex-Director General, Geological Survey of Pakistan.	Rs. 1,56,630/-
PHYSICAL SCIENCES		
Fabrication and Characterization of Impurity States Introduced by Diffusion Mechanism in Semi-Conductor Materials.	Dr. Nasim Babar, Assistant Professor, Department of Physics, Quaid-i-Azam University, Islamabad.	Rs. 3,55,100/-

C-QU/PHYS (68)		
Wave Propagation and Transport Phenomenon in controlled fusion C-QU/Phys (69)	Prof. Dr. G. Murtaza, Department of Physics, Quaid-i-Azam University, Islamabad.	Rs. 4,60,700/-
Study of Plasma Focus Discharge. C-QU/Phys (70)	Dr. M. Zakaullah, Assistant Professor, Department of Physics, Quaid-i-Azam University, Islamabad.	Rs. 3,05,100/-
Optical Characterization of Defects in Semi-Conductors. C-QU/Phys (71)	Dr. M. Zafar Iqbal, Associate Professor, Department of Physics, Quaid-i- Azam University, Islamabad.	Rs. 5,13,793/-
Electronic Spectra of Diatomic Molecules. S-KU/Phys (72)	Prof. Dr. Muhammad Rafi, Department of Physics, University of Karachi, Karachi.	Rs. 3,90,400/-
Weak Interactions in a Medium & their Implications in Astrop-Physics/Cosmology, C-QU/Phys (73)	Prof. Dr. Kamal-ud-Din Ahmed, Department of Physics, Quaid-i-Azam University, Islamabad.	Rs.2,29,767/-
Optical Studies of Liquid Crystals, S-KU/Phys (74)	Dr. Iqbal A. Khan, Assistant Professor, Department of Physics, University of Karachi, Karachi.	Rs. 3,14,833/-
Numerical/Experimental Study of Z-O Pinch Device. C-QU/Phys (75)	Prof. Dr. Sakhawat Beg, Department of Physics, Quaid-i-Azam University Islamabad	Rs. 3,02,000/-
High Resolution Studies of Atoms and Molecules. C-QU/Phys (78)	Dr. M. Aslam Baig, Associate Professor, Department of Physics, Quaid-i-Azam University, Islamabad.	Rs. 3,68,270/-
MEDICAL SCIENCES:		
A Historical and Bacteriol-ogical Study of Tubercu-	Prof. Dr. Syed Mehmood Alam, Department of Pathology, Basic	Rs. 38,000/-

losis Lymphatdnitis. S-JPMC/Med	Medial Sciences Institute, JPMC, Karachi

b) Institutional Support

PSF supports R&D institutes in the form of "Institutional Support". During 1990-91, an amount of Rs. 3,67,400/- was released to the following five (5) institutes or the universities departments and colleges on account of institutional support grant for the purpose mentioned against each.

Name of Institute/ Department	Purpose of grant:	Amount:
-Department of Physiology, Faculty of Animal Husbandry and Veterinary Sciences, Sindh agriculture University, Tando Jam.	Purchase of accessories for some major laboratory Equipment.	Rs. 1,22,400/-
-Department of Chemistry, Gomal University, D.I.Khan.	Purchase of spare parts and repair of infrared and ultra-violet spectrophotometers.	Rs. 1,00,000/-
-Department of Microbiology, Institute of Pure & Applied Biology, Bahauddin Zakariya University, Multan.	Purchase of laboratory equipment.	Rs. 85,000/-
-Department of Chemistry, Federal Govt. (Postgraduate) College, Islamabad.	Purchase of chemicals.	Rs. 50,000/-
-Marine Reference Collection Center, University of Karachi, Karachi.	Purchase of scientific literature.	Rs. 10,000/-

2. RESEARCH EVALUATION

The technical/fiscal reports received during the report period were evaluated as per procedure laid down by the Foundation for reviewing the progress of PSF supported research projects. The details of these projects are as under:-

a) On-Going Projects

i) Semi-Annual Reports

Twenty-eight(28) semi-annual reports received after the initiation of each project or after the submission of the annual reports, were scrutinized by the Research Support Section to assess the interim progress of these projects and to release their next due installments.

ii) Annual Reports

After preliminary scrutiny by the staff of Research Support Section, the reports were sent for detailed evaluation to the subject experts in the relevant fields. The progress reports along with the evaluation reports were then submitted to respective technical committees for consideration and acceptance. The remarks of the technical committee, if any were conveyed to the Principal Investigators of the projects for requisite action.

Research grants totaling to Rs.2.07 million were released on account of various installments in respect of the on-going projects mentioned above, after their technical and fiscal evaluation.

b) Completed Projects

Final Reports of 13 research projects titled below were received during the year. The reports were evaluated by the subject experts, subsequently, these reports along with reviewer's comments were submitted to the relevant Technical Committees for consideration and adoption.

Completed Projects/Final Reports

Project Reports:	**Project Title:**
P-PU/Bio (153)	Studies on the Stability of Hybrid Plasmids carrying segments of *Bacillus subtilis in E coli*
P-BU/Bio (160)	Parasitic survey of Wild Birds in the Province of Balochistan.
S-KU/Bio (167)	Guide to the Malacostraca of the Northern Arabian Sea
S-BU/Chem (162)	Chemistry and Bio-Chemistry of Glyco-protein Sulfo-transfereases and Sulphate acceptors
S-KU/Chem (163)	Amino acid sequence study on Hemoglobin and venom from snakes found in Pakistan
P-CSIR/Chem (171)	Biosynthesis of Antibiotic Bacitracin by *Bacillus dicheniformis* as supplement in poultry feed

P-PU/Earth (24/1)	Geochemistry & Mineralogy of Sardhi formation and related rocks of the salt range, Punjab
P-BZU/Maths (15)	Study of Properties of BCK and BCI algebra and their categorical aspects.
S-KU/Med (108)	Studies on protein changes in senile cataract.
S-JPMC/Med (129)	Use of leu-M, monoclonal antibody for the diagnosis of Nodgkins disease.
S-NIO/Ocean (9)	Feasibility studies for the extraction of energy from currents and heliohydro-gravity along Pakistani coast.
S-KU/Phys (51)	Electronic spectroscopy of Molecules.
C-QU/Phys (54)	Atomic Photoabsorption Spectroscopy at high resolution.

Brief summaries of the work accomplished under the above projects are as under:

Project No.	P-PU/Bio (153)
Project Title	Studies on the Stability of Hybrid Plasmids Carrying Segments of *Bacillus subtilis* Genome in *E.coli.*
Name of P.I.	Dr. Shahida Hasnain

Summary of the Work:

Bacteria of genus Bacillus are attractive host for the manufacture of many important enzymes. Successful exploitation of genetically engineered strains depends on the development of a new-plasmid interaction that accomplish stable high level expression of recombinant metabolites on large scale. Since, natural low copy number plasmids do contain maintenance mechanisms, they can stably perpetuate themselves in the host organism. Contrary to natural plasmids, hybrid plasmids exhibit instability, resulting in the loss of either entire plasmid or part or whole of inserted sequences during culture. Multicopy plasmids are used for high level expression of the cloned gene, but enhanced expression exert metabolic burden on the bacterial host cell and reducing the growth rate of plasmid harboring cell.

For high level expression, high number plasmids are used for cloning purposes, because hybrid plasmids face instabilities due to high level expression or metabolic burden imposed on host cells. Hasnain and Thomas(1986) has constructed a novel gene bank of B. subtilies in low copy number vector plasmid, and its copy number can be increased under particular conditions.

Plasmids pSH66, pSH263, pSH550, pSH1012 and pSH1019 of this gene bank strongly hybridize with pyr DNA, were used during these studies and it was observed that: i) pSH1012 is a stable plasmid both in low as well as high copy number strains, and it complements pyr gene in Escherchia coli, ii) other plasmids are not stable when placed at high copy number and undergo various changes, and pSH263 and pSH1019 have large

inserts and cannot be transformed to high copy number strain. iii) transformation efficiency of pSH96 and pSH550 is affected severely when high copy strain is used for transformation, iv) verstricition pattern of all these hybrid plasmids, with EcoRI, SaLL, Hind III, Pst I has been worked out, and v) genetic mapping of pyr loci on the B. subtilis fragment was done by transforming these plasmids to different auxotrophs of pyr loci, and pyrD was found to be present in all.

All the plasmids studied during these investigations exhibit segregational instabilities when grown in the absence of selection pressure and an initial decrease in the plasmid bearing cells is generally followed by the increase in fraction of plasmid-containing segragants. Plasmids pSH96 and pSH550 showed more segregational instabilities while pSH1019 was comparatively more stable. pH, temperature and glucose concentration of the medium obviously affect plasmid stability. Increase in copy number under pH or temperature stresses worstly affected plasmid stability, while in varying glucose concentrations of media, elevated copy number manifested more plasmid stability, decrease in Km concentration of the culture medium resulted in segrational loss of hybrid plasmid, and concentrations above optimum did not exhibit remarkable increase or decrease in plasmid bearing cells.

The studies have led to the conclusion that at one very high selection pressure the plasmid undergo structural instabilities, recA mutation drastically affected segregational stability of hybrid Plasmids, and fluctuations were so inconsistent that important of recombination repair system to stable maintenance of plasmid become evident.

Project No.	B-BU/Bio (160)
Project Title.	Parasitic Survey of Wild Birds in Balochistan Province.
Name of P.I.	Dr. Mohammad Nawaz.

Summary of the Work:

Birds constitute a huge class of vertebrate animals comprising of 8,600 species out of which more than 650 species have been recorded in Pakistan. They have been used extensively in the study of the pathology of malarial parasites, and screening of antimalarial drugs, as they are also subject to many diseases, just as man and other animals play host to an extensive array of parasites, which include plasmodium Haemoporoteus, Leucocytozoon, Trypanosomes and Mivropilaria, etc.

A little work has been done on Haematozan parasites of birds in Pakistan, particularly in the province of Balochistan, which is a zoologically interesting area because of its geographic resemblance to Palaeortic Region and concurrent possession of some unique avifauna.

Under this project, blood smears were examined from over 1000 birds belonging to 46 species representing 26 Families. The infection rate was found as under:

Overall infection of blood parasites.	13.52%
Heamoproteus.	8.23%
Plasmodium	3.43%
Leuscytozoon	0. 83%
Microfileria	0.39%
Trypnosoma & un-identified parasites less commonly observed	0. 09%

Haematozoan prevalence in different geographical region were compared. A large proportion of the birds from Sibi, Quetta and other collection sites harbored Haematozoa. This was partially due to the different spices assemblages sampled at the various locations.

Haemoproteus was found much more common parasite in all these areas Plasmodium was the second commonest ,although absent in few areas prevalence of Haemoproteus varied, ranging from 4.74% to 16.66%. Certain bird Families represented by 100 or more individuals from each area, showed relatively less parasitism.

Almost all of the birds species examined are listed for the first time as hosts for haematozoa from Pakistan.

Project No.	S-KU/Bio (167)
Project Title:	A guide to the Malacostraca of the Northern Arabian Sea.
Name of P.I.	Dr. Nasima M. Tirmizi.

Summary of the Work:

A guide to the identification of Malacostraxans occurring in the northern Arabian sea has been compiled for the first time which contains identification keys to the orders: stomatopoda, decapoda, mysidaceas, cumacea.

To date, about 600 species of Malacostracans are found to occur in area under investigation, they are referable to 415 genera and 15 families. Key to the major taxa of the class Malacostraca is added for a beginner. The key leading to species is for the use of specialists. A dendrogram has been prepared showing evolutionary trend in class Malacostraca. The keys are updated by incorporating recent changes in the nomenclature. Most of the outline drawings are original and characters used in the keys are illustrated to make the keys accessible to researchers entering in the field, and will serve as valuable assets of the discipline.

Project No.	B-BU/Chem (162)
Project Title	Chemistry & Biochemistry of Glycoprotien Sulfotransferases & Sulfate acceptors
Name of P.I.	Dr. S. Altaf Hussain.

Summary of the work:

During this project intestinal glycoprotien was purified from homogenized scraping of rat epithelial cells using gel chromatography. High molecular weight mucin was separated from low molecular weight protein by the help of chromatography. The purified glycoprotein were examined for purity by poyacrylamide gel electrophoresis. The carbohydrate and amino acids analysis of the purified glycoprotien showed the difference in sugars and amino acids. It appeared that glycoprotien obtained from small intestine differs structurally. This reflects the presence of different types of glycosyle linkages in these glycoprotein. This study indicates that intestinal glycoprotien consists of at least three closely related high molecular weight glycoprotein which can be separated from other contaminants by the help of chromatography.

Project No.	S-KU/Chem (163)
Project Title	Amino-acid sequence Study on Hemoglobin and venom from snakes found in Pakistan.
Name of P.I.	Dr. Zafar H. Zaidi.

Summary of the Work:

Trypsin inhibitor from the venom of the cobra, Naja naja, naja has been isolated by a single step of reverse phase high performance liquid chromatography. The protein strongly inhibits trypsin (Ki =3.5x10-12M). The primary structure was determined by peptide analysis of the C-carboxymethylated inhibitor. The 57-residue polybeptide chain belongs to the family of Kunitz-type inhibitors, and exhibits 42% residue identity with bovine pancreatic typsin inhibitor. The structure shows only 70% identity with the corresponding peptide from the cape cobra (Naja nevia), establishing that the inhibitor molecule exhibits extensive variations. Functionally, a basic residue at position P3, correlates with strong inhibition.

Project No.	P-CSIR/Chem (171)
Project Title	Biosynthesis of antibiotic Bacitracin by Bacillus licheniformis as supplement in Poultry Feed.
Name of P.I.	Dr. M. A. Qadeer.

Summary of the Work:

Bacitracin is a polypeptide antibiotic which is active against gram positive and few gram-negative bacteria. This antibiotic has been used with reasonable success for the control of infections problems of animals. Feed supplement containing bacitracin in various forms have proved to be quite effective and economical.

The project was undertaken to study the production of antibiotic bacitracin by Bacillus licheniformis in laboratories on pilot plant scale in the stirred fermenter, and also by solid state fermentation process using Agricultural by-products, such as soybean, meat, sun-flower meal, and wheat bran etc., as starting material. The conditions for the isolation of antibiotic from the fermented mush were also optimized. The evaluation of zinc bartracin in poultry feed was carried out by feeding to the poultry.

Project No.	P-PU/Earth (24/1)
Project Title	Geochemistry & Mineralogy of Sardhi formation & Related rocks of the Salt Range.
Name of P.I.	Dr.F. A. Shams

Summary of the work:

Research on Sardhi Formation and warchha sandstone were planned due to old reports of copper occurrence in these rocks. It was also realized that Sardhi Formation is top of the Permian Nilawahn Group. The later has Tobra Formation of glacier origon at its base succeeded by Dandot Formation. The permian is well known to mark the period of continental rifting of the Indo-Pak plate with the rift basin receiving sedimentation. In the permian time the sedimentation is known to be derived from south, although in mesozoic the direction of sedimentation was reversed. In the first phase of the project, warchha sandstone and Sardhi formation were systematically sampled, and studied in the laboratory. It was found that copper mineralization was more common in the Sardhi Formation but was rather sparse in the Warchha sandstone. Therefore in the second phase of the project the work was concentrated on the Sardhi Formation. The research was mainly based on field studied , involving sampling from measured section, petrography analysis with advance optical method, mineral separation, and their studied chemical analysis, trace element analysis, radiometric studied, X-Ray Diffraction analysis, and all other techniques wee utilized which appeared necessary.

Among major results of the studies, it was found that monotonous Sardhi Formation has lithologic banding shown by variation minerals, textural and chemical variation. The clay minerals show a variety and pecular association. zeoloits has also developed locally as tiny grains, but, also as thin veins. Regionally copper minerals are concentrated in the eastern part of the Sardhi Formation locally they make with high concentration. There is no anomaly radioactivity in the entire section of the Sardhi formation and the Warchha Sandstone.

This study, the first of its kind of this important formation, proved that the Sardhi Formation derived from the volcanic material, which could have been also the source of copper mineral, as native copper is known to occur in such formation. This mean that systematic studies should also be carried out in the central zone of Salt Range. In addition structural studies should also be included to find/influences of rift tectonics, because, if such zones are properly delineated, it can provide an important framework for mineral prospecting in the salt Range. A regular field mapping combine with laboratory study can help locating the economically rich zone of the Sardhi Formation.

Project No.	P-BZU/Maths (15)
Project Title	Study of Properties of BCK and BCI algebra and their Categorical aspects.
Name of P.I.	Dr. Muhammad Anwar choudhry

Summary of work:

BCK and BCI-algebras were introduced by Japanese mathematician. K. Iseki and Y. Imai in 1966 as generalization of certain properties of prepositional calculi. The major part of the research done on these algebraic structures in due to Japanese, Polish, Chinese, Canadian, Pakistani and Indian mathematicians namely: K. Iseki, S. Tanaka, H. Yutani, M. Palan s Ki, Q. P Hu, M.Daoji, C.S.Hoo, J. Ahsan, A.B.Thaheem, M A Chaudhry, B. Ahmad, S. K. Goel, R. Murti and many others. They discovered the first order theory of those algebraic structures and studied various aspects including ideal theory.

But the categorical aspects of BCI-algebras remained un-investigated. The classification of BCK-algebras like positive implicative, implicative, commutative and bounded BCK-algebras are found in the literature, but, their generalization regarding BCI-algebras are yet to be investigated. Under this project the categorical aspects o BCI-algebras and classification of BCI-algebras have been studied. The report is divided into two parts. In Part 1, the category of BCI-algebras has been studied and proved that:

1) The category BCI of BCI-algebras and BCI homomorphisms has products and equalizers.
2) Let f BCI (x,y) be onto, then f is a coequalizer.
3) The category BNCI has Kernel paris.
4) In BCI, conqualizers and onto homomorphisms coincide.
5) The restriction of BCI-monomorpism f:x --y to the centers fG :XG--YG is a monomorphsim as well as one-one.
6) Epimorphisms in MBI, the category of medical BCI-algebras and BCI homomorphsms, are onto.

7) The category BCI has co-equalizers.

8) (Coequalizers. Monomorphisms) form an image factorization system in the category BCI.

9) The category MBCI is reflexive subcategory of BCI.

In part-II two new classes of BCI-algebras namely the class of weakly positive implicative BCI-algebras and the class of weekly implicative BCI- algebras have been introduced.

It has been proved that:

10) Let X be a BCI-algebra, X is weakly positive implicative if an only if x*y = (x*y)*y)*(o*y).

11) Every weakly positive implicative BCI-algebras is quesi-commutative of type(i,j,:j,i+1) for all i>o, j>1.

12) Every weakly implicative BCI-algebras is weakly positive implicative.

13) A weakly implicative BCI- Algebra X with weak unit is weakly commutative.

14) a weakly implicative BCI-algebra with weak unit is weakly positive implicative and weakly commutative.

The investigation of categorical properties will help in establishing the relationship of BCI-algebras with other algebraic structures, whereas introduction of two new classes of BCI-algebras and their classification will help in investigating the structure of the branches of BCI-algebras may be extended now to BCI- algebras.

Project No. S-KU/Med (108)

Project Title: Studies on Protein Changes in Senile Cataract.

Name of P.I. Dr. Zafar H. Zaidi.

Summary of Work:

Opacity of leans i.e. cataract is a ubiquitous disease in the aging humans, which deprives them of their visual activity. In Pakistan, cataract is more common than other countries with an onset about twenty years earlier than is Europe, the mechanism underlying cataract formation has not yet been clearly understood, and by for the most common of these discovers, the senile cataract, is amongst the least understood . As the eye lens is quite rich in structural proteins i.e. crystalloid and albuminoids it has therefore, long been supposed that the ultimate event in cataractogenesis is essentially disturbance in the state of lens proteins.

The project research was directed towards exploring the chemical, biochemical and structural causes of lens degeneration by detecting the possible variations in proteins obtained from normal and cataract lens, and isolating and characterizing the specific variables as well as studying the possible changes in the aqueous humor of the cataract patients

A comparison of the amino acid content of the collected cataract aqueous humor samples with the data available for American and European population has shown that except for glycogen, most of the amino acids in Pakistani cataract patients are lower in concentration. This variation in the amine acid composition reflects the habits of Pakistani population, although racial determination may also be involved to some extent.

Blood plasma studies showed that the concentration of all the amino acids was high in cataractous blood plasma except for glulamic acid which was found to be higher in the blood plasma of normal subjects. The separation of immature, mature and hyoermature cataracts on the basis of their hydrophobicity has shown that immature and mature cataract lenses have similar profile in reverse phase PHLC, while hypermature lens shown a different pattern.

Levels of gamma crystalline the lowest molecular weight protein in the lens, decrease markedly during aging and catratogenesis.. A new simplified procedure was worked out for its isolation and structural strdyu. From the results achieved under this project, it was concluded that the low income group is more susceptible for cataract development at early age, which can be attributed towards their nutritional habits and low protein intake. Thus, there is a possibility that cataract occurrence may be delayed to certain extent by improving the nutritional habits of our people.

Project No.	S-JPMC/Med (129)
Project Title	Use of LweuM1 Monoclonal Antibody for the Diagnosis of Hodgkin's Disease.
Name of P.I.	DR. Capt. Ghulam Mustafa Memon.

Summary of Work:

Hodgkin's disease, if diagnosed at an early stage, and treated effectively, has a good survival rate and prolonged life expectancy as compared to Non-Hodgkin's lymphoma. In the diagnosis of this disease, detection of "Reed Sternberg" cells along with other components of Lymphytes and Sclerosis is of utmost importance, as it helps in differentiating Hodgkin's disease from various other forms of Non- Hodgkin's Lymphoma and reactive Lymopodentities.

The present study was designed to determine the applicability of Immunoperoxidase staining techniques for histological diagnosis and specificity of LeuM1 monoclonal antibody in the demonstration of "Red Sternberg" cells in Hodgkin's

disease. Fifty cases of Hodgkin's disease, thirty cases of NOn-Hodgkin's lymphoma and twenty cases of Reactive Lymhadentities, which were diagnosed earlier by H E test, were included in the study.

As regards the thirty cases of Non-Hodgkin's Lymphoma, one such case was detected to be of Hodgkin's disease, which was wrongly diagnosed as non-Hodgkin's lymphoma by the H S test. similarly, one out of twenty cases of Reactive Lymphodentites studies, revealed the possibility of Hodgkin's disease.

The present study has thus substaniated the findings of other workers that indirect immunperoxidase technique can be employed with advantage to demonstrate the leu M1 antigen in the "Reed Sternberg" cells for the diagnosis of Hodgkin's disease. Moreover,this technique can also be used in such cases where there are diagnostic problems in differentiating Hodgkin's disease, Non Hodgkin's Lymphoma and Reactive Lymphadentites.

Project No.	S-NIO/Ocean (9)
Project Title:	Feasibility Studies for the Extraction of Energy from Current and haliohydrogravity along Pakistan Coast.
Name of P.I	Dr. G.S.Qureshi.

Summary of Work:

With the day to day modernization of life and inventions of electronic luxury devices, the energy demand of the world is increasing constantly, while the resources of fossil and Nuclear fuel for its production are dwinding . The situation in Pakistan is even more critical due to the lack of information and proper utilization of the available energy sources. Pakistan has a coastline of 990 km with unique feature of creeks and partially enclosed bays and lagoons, and 170 km coastline is such which can be harnessed to extract. The project was undertaken to carry out feasibility studies for the exploration of the oceanographic resources in the Indus Delta for the power potential. Two possible sources of renewable energy i.e. from tidal currents in creeks, and from heliohydrogravity in lagoons and bay were investigated.

A total of 15 major creeks of the Indus Delta were surveyed and observations of tidal currents at flood and ebb were taken from different depaths at selected cross sections. In additions various parameters including bottom topography, salinity, temperature, dissolved oxygen, turbidity etc. were also investigated. In addition, two lagoons and bays were surveyed and observations of evaporation and precipitation were taken for 3-months at each site.

The study which was first of its kinds in this area, has reveled most encouraging results and showed a high and worthwhile potential in nearly all individual creeks and bays surveyed. With the results estimated for tidal power in the Indus delta regions, it

seems that a power station of about 900 MW could be established to serve the neighboring population in Pakistan.

Project No.	S-KU/Phys (51)
Project Title	Electronic Spectroscopy of Molecules.
Name of P.I.	Dr. M. Rafi.

Summary of Work:

During this project, the main objet of studies was to investigate the electronic spectra of diatomic molecules, and their electronic spectra comprising of the bands and rotational lines. In recent years molecular spectra of alkali dimers have become of increasing importance as these molecules are considered as prospective candidates for laser process. Under this project, the Investigators have carried out the analysis on the absorption spectrum of molecules like Li2 , Na2 and K2 which led to identifying new electronic states in Na2 and K2 (1,2,3) A-X systems of I , iH. NaH and KH were studied in absorption and extension in the spectra had been recorded which have new vibrational states of A states.

The graphical and computer methods have been used to do the analysis. The software was developed in the Laboratories of Physics Department, Karachi University. Modification of directly heated steel tube furnace done under this project, and King-type furnace are unique facilities developed in these Laboratories to undertake meaningful absorption studies. These studies reveled quite significant findings in the form of new electronic and vibrational states.

Project No.	C-QU/Phys (54
Project Title:	Atomic Photoabsorption Spectroscopy at High Resolution.
Name of P.I.	Dr. M. Aslam Baig.

Summary of the Work:

Under this project the Investigators have designed, and locally constructed a three meter normal incidence off-plane eagle mounting spectrograph at the Atomic and Molecular Physics Laboratory, Department of Physics, Quaid-i-Azam University, Islamabad. The spectrograph is equipped with a 5000 lines/mm holographic concave grating , adjustable slite width between 10-100 mm and a photograph detection. The performance of the equipment has been examined from the view point of resolution by taking emission spectra of iron in the 1900-3600 A in the first order. the well known triplet at 3100 A is recorded at different slit rotations in order to achive the maximum

resolution The reciprocal dispersion of the equipment is found to be 0.34 A/mm at 3100. the resolving power ever reported for this wavelength region in the first order.

The photoabsorption spectra of alkali atoms Na and K, have also been photographed and the high Rydberg states of these atoms have been extended to high principal quantum number. For the vapour containment system the Investigators have locally constructed high temperature furnace (heated zone 70 cm, maximum temperature 1200c). For the photocoabsorption studies a high pressure Hg lamp and the Dz (Deuterium) lamp have been installed in the laboratory. A microdensitometer facility at the laboratory has also been established, in order to facilities the data reduction recorded photographically to extract the line profile parameters.

In addition the Photoabsorption data on In, Ga, Cr, Pd, Cu and Ag have been published in the international journals.

3. SCIENTIFIC SOCIETIES/LEARNED BODIES

One of the main function of PSF is the promotion of learned bodies, scientific societies/associations and academies engaged in spreading the cause of scientific knowledge in general or in the pursuit of a specific scientific discipline or technology in particular.

The Foundation is making annual grants to the established learned bodies and scientific societies, as partial financial assistance for the achievement of their approved objectives and publication of their respective scientific journals. Annual grants amounting to Rs.0.445 million were released during the year 1990-91 to following scientific societies.

Name of Society	**Grant in Rupees**
Pakistan Academy of Sciences:	Rs. 1,00,000/-
Scientific Society of Pakistan;	Rs. 65,000/-
Pakistan Association of Scientists & Scientific Professions:	Rs. 30,000/-
Pakistan Association for Advancement of Sciences:	Rs. 60,000/-
Pakistan Society of Nematologists:	Rs. 15,000/-
Zoological Society of Pakistan;	Rs. 30,000/-
Pakistan Botanical Society:	Rs. 30,000/-
Biological Society of Pakistan	Rs. 30,000/-
Pakistan Society of Biochemists:	Rs. 15,000/-
Chemical Society of Pakistan:	Rs. 35,000/-

Pakistan Medical Association:	Rs. 15,000/-
Institute of Electrical Engineers:	Rs. 20,000/-

Grants totalling to Rs. 0.105 million were also sanctioned to various institutions for publication of scientific journals as detailed below:

Institution:	Name of Journal:	Amount of Grant
University of Karachi, Karachi.	Pakistan Journal of Pharmacology.	Rs. 10,000/-
Faculty of Pharmacy, University of Karachi, Karachi.	Pakistan Journal of Pharmaceutical Sciences.	Rs. 10,000/-
Pakistan Council of Science & Technology.	Journal of Science Technology and Development	Rs. 25,000/-
Pakistan Forest Institute, Peshawar	Pakistan Journal of Forestry	Rs. 10,000/-
Mehran University of Engineering & Technology, Jamshoro	Mehran University Research Journal	Rs. 10,000/-
Khyber Medical College, Peshawar.	Pakistan Oral & Dental Journal	Rs. 10,000/-
University of Agriculture, Faisalabad	Pakistan Veterinary Journal	Rs. 10,000/-
Government College, Lahore.	Journal of Natural Sciences and Mathematics.	Rs. 10,000/-
Federal Government Urdu Science College, Karachi.	Urdu Journal Tahqeeq	Rs. 10,000/-

4. EXCHANGE OF VISITS

Foundation provides travel grants to the scientists for participation in international conferences in order to enable them to present the findings of research carried out by them within the country, exchange information regarding recent advances in their respective fields of specialization, and visit reputed research laboratories in foreign countries.

Grants totalling to Rs. 0.165 million were sanctioned to the following six (6) scientists during the report period:

Name & address of the Scientist	Conference /Seminar attended	Grant Sanctioned:
Dr. M.Ibrahim Penhwar, Department of Mech-Engg., Mehran Engg. University Jamshoro.	7th IMC Conference on Advanced Manufacturing Technology and Systems, held at Dublin, 29-31 August 1990.	Rs. 22,268
Dr. S.U.Sheikh, Department of Chemistry, Quaid-i-Azam University, Islamabad	International Symposium on Macromolecules, held at Montreal Canada from 8-13 July, 1990	Rs. 38,760/-
Prof. Dr. Imtiaz Ahmad, Department of Zoology, University of Karachi, Karachi.	7th International Congress of Auchenorhpncha, and 3rd International Workshop on Leafhoppers, held at Wooster, Ohio, USA, 13-17 August, 1990	Rs. 26,973/-
Dr. Ehsan Ullah Khan, Associate Professor, Gomal University, D.I.Khan	15th International Conference on Particle Tracks in solids, held at Hamburg Germany, 3-7 September, 1990	Rs. 23,250/-
Dr. Aftab Ahmed Butt, Assistant Professor, Institute of Geology, University of Punjab, Lahore.	International Geological Correlation Programme, 216 Bio-Events, held at Oxford, U.K. from 24-28 September, 1990	Rs. 21,600/-
Brig. S.E.Rana, Army Medical College, Rawalpindi.	To Complete Research Project at the Institute of Anatomy, University of Berlin, Germany, September, 1990.	Rs. 32,000/-

5. AWARDS AND FELLOWSHIPS

PSF grants in-country fellowships for higher studies. During the year, one fellowship @ Rs. 1,500/- p.m. for a period of one year was awarded to a Ph.D. research scholar, Mr. Mohammad Danish working on "Synthesis, Characterization & Biological Activities of Organotin Complexes" at the department of chemistry, Quaid-i-Azam University Islamabad. An amount of Rs. 18,000/- was released to the university on

account of the fellowship grant for the year, 1990-91. An amount of Rs. 6,000/- was released to the University of Balochistan, Quetta on account of 3rd installment of M.Phil fellowship to the research fellows working in the chemistry department.

6. INTERNATIONAL LIAISON

a) US-NSF Collaborative Projects:

The US-NSF collaborative project entitled "Chromosome Number of Vascular Plants of Pakistan" continued and an amount of Rs. 0.260 million was released to the University of Karachi on account of its last instalment.

b) Exchange of Visits:

A two member delegation, comprising a Chief Scientific Officer of the Foundation and Deputy Scientific Adviser of the Ministry of Science & Technology, visited National Science Foundation of China for a period of one week in September 1990 to see the working of the Chinese Science Foundation and implementation of its research projects in various universities. The visit was under item 9-312 of the 10th S&T protocol between the Govt. of Islamic Republic of Pakistan and the Peoples Republic of China.

To reciprocate this visit a three member delegation from National Natural Science Foundation of China (NSFC) visited Pakistan in June,1991. During their stay, the delegation met scientists in the universities and some research institutions at Islamabad, Peshawar and Karachi. The visit was aimed at establishing an active liaison with Pakistan Science Foundation for promoting collaborative research between the universities and research institutions of both the countries. For the proposed, collaboration between the two sister organizations a draft MoU was sent to the Ministry for obtaining requisite Govt. approval

Dr. B.A. Sheikh, Chairman, Pakistan Science Foundation paid a one week visit to U.K. under MoU with Royal Society, London. The visit was aimed at discussion for renewal of the MoU with Royal Society and exploring possibilities of collaboration with Royal Society and British Science Museum for training of staff.

The Principal Scientific Officer of PSF attended a meeting in December 1990 with regard to the UNDP project in Manila and presented country paper for Pakistan.

B. SCIENCE POPULARIZATION SECTION

The activities of Pakistan Science Foundation for promotion and popularization of science through various programmes continued during the year. 1990-91 A summary of these programs is given below:

1. FUNDING FOR SCIENCE CONFERENCES/ SYMPOSIA/ SEMINARS

The Foundation provided financial assistance for national and international science conferences, seminars, symposia, workshops held in Pakistan. During the period under report, grants totaling Rs. 0.300 million were released for partially sponsoring the following events.

S.No.	Event	Organizing Agency	Amount
1.	3rd International Congress	Faculty of Veterinary Sciences, University of Agriculture, Faisalabad	Rs. 30,000/-
2.	20th Annual Convention of IEEP	The Institute of Electrical Engineers Pakistan (Lahore Local Centre) 4, Lawrence Road, Lahore-54000.	Rs. 20,000/-
3.	9th Science Exhibition	Department of Education Bureau of Curriculum Extension Centre, Balochistan, Quetta.	Rs. 30,000/-
4.	3rd National Symposium on Frontiers in Physics.	Department of Physics, Quaid-i-Azam University, Islamabad.	Rs. 20,000/-
5.	32nd I.E.P. Annual Convention	The Institute of Engineers Pakistan (Lahore-Centre), Lahore.	Rs. 25,000/-
6.	Second National Chemistry Conference	H.E.J. Research Institute of Chemistry, University of Karachi, Karachi.	Rs. 25,000/-
7.	International Conference on Teaching of physics.	APWA Government College for Women, Karachi.	Rs. 10,000/-
8.	Physics Annual Conference	Centre for Solid State Physics, University of the Punjab, Lahore.	Rs. 20,000/-
9.	7th Summer School in Science.	Board of Intermediate & Secondary Education, Lahore.	Rs. 30,000/-

10.	Workshop on Science and Technology Reporting.	Pakistan Council of Science and Technology, Islamabad.	Rs. 50,000/-
11.	First SEGMITE Symposium on Export Promotion of Mineral Products and Gemstones.	Pakistan Council of Scientific and Industrial Research (PCSIR) Laboratories, Peshawar.	Rs. 10,000/-
12.	Workshop on Restructuring of Higher Education in Pakistan	Peshawar University Teacher's Association Peshawar.	Rs. 10,000/-
13.	National Seminar on Progress in Geography in Pakistan	Department of Geography University of Peshawar Peshawar	Rs. 20,000/-

2. SCIENCE FAIR/EXHIBITION

PSF provides finances to Boards of Intermediate & Secondary Education for organization of Science Fairs and Exhibitions in the schools. During the period, an amount of Rs.0.03 million was released to the Board of Intermediate & Secondary Education Quetta for organizing the 9th Science Exhibition.

3. SUMMER & WINTER SCHOOLS IN SCIENCE FOR TALENTED HIGHER SECONDARY SCHOOL STUDENTS

To acquaint the Higher Secondary School students about the role of basic and fundamental sciences in national development, summer & winter schools in science for talented higher secondary students is a function which the Foundation actively supports. An amount of Rs.0.03 million was released to Board of Intermediate & Secondary Education, Lahore for organizing the 7th Summer School in Khanespur.

4. POPULAR SCIENCE LECTURES

Popular science lectures are arranged in PSF auditorium in which eminent scientists/educationists express themselves in simple language to the mixed audience. The following lectures were arranged:

Date	Topic	Speaker
5.1.1991	Skeletal Muscle Transplantation	Dr. Shahzad Ahmed Mufti, Director General Pakistan Museum of Natural History, Islamabad.
11.2.1991	Drug Disposition in the Body	Dr. Mohammad Nawaz, Associate Professor Pharmacology, University of Agriculture, Faisalabad.

5. FILM/PLANETARIUM/SLIDE SHOWS

a) Science Film/Planetarium Shows

The Foundation continued screening science films in schools of Islamabad/Rawalpindi. A total of 252 shows were arranged in 22 schools. Also 240 planetarium shows with the help of portable planetarium were arranged during visits to the schools.

b) Science Slide Shows

A program of Science Slide Shows has been developed for showing to students and the general public. The following themes are included:

i. Scientific & Technological Programmes in Pakistan
ii. Sea Animals in Pakistan
iii. Heavenly Bodies
iv. Extinct Animals

Five sets containing a total of 900 slides have been prepared and are ready for showing.

c) Purchase of 16 mm Films

Thirteen 16-mm documentary films on popular science themes, like Universe, Nervous System, Animal, Homes etc. were purchased from MMI Corporation and converted into video format through cooperation of Allama Iqbal Open University, Islamabad.

6. DONATION OF SCIENCE BOOKS & MAGAZINES

The Foundation continued distribution of science books, magazines to educational institutions free of cost. The list of the institutions receiving the material were as under:

1. Shaikh Library, Sukkur.
2. Pak German School, Multan.
3. National Science Club, Faisalabad.
4. Islamic Science Foundation International, Chakwal.
5. Islamic Public Library, Gujar Khan, District Rawalpindi.
6. Shah Public School Near Agricultural University, Peshawar.
7. Blessing Home School: Faisalabad.

The Foundation subscribed the popular science magazines, Jadid Science & Science Bachoon Ke Liye to 600 schools in the country. The Foundation also subscribed Science Digest for the year 1990-91 for 60 schools of AJK, FATA, Nothern Areas & Balochistan.

7. SCIENCE CLUBS IN HIGH SCHOOLS

Phase-I

It was decided that Colorimeters alongwith glassware, material & instructions for carrying out 16 experiments in Chemistry & Biology be provided to 500 schools participating in Phase-I of the Foundation's Science Clubs programme, 250 Colorimeters have already been received in the Foundation.

Phase-II

It was decided to bring the total number of schools in phase-II to 300. Todate, 234 schools are enrolled which have been provided with the grants of Rs. 500/- per club for purchase of materials for the experiments given in the booklet entitled "Science Project for High Schools".This booklet is published by PSF. The clubs have also been provided with science related literature in the form of PSF publications and two sets of 30 booklets on science published by Urdu Science Board Lahore. Also solar cookers alongwith cooking pots and instruction booklet have been purchased for Phase-II enrollees.

Prospects of UNDP assistance for Science Club Programmes were discussed with Dr. I.N. Davis, Chief Technical Adviser, UNDP, on his visit to the Foundation (16.10.1990) Dr. Davis also visited two science clubs in Islamabad, which were participants of the Foundation's Science Clubs Programme. He held meetings with the Chairman, Member Science, PSF and officers of Ministry of Science & Technology in connection with the UNDP project RAS/86/090, "Support to Field Level Demonstration and Training units in Science & Technology."

8. PSF SCIENCE BULLETIN

PSF has launched publication of a quarterly science bulletin containing information regarding scientific activity of PSF and sister science organizations, scholarships available and job opportunities. It also contains articles of general interest to the readers. The bulletin is dispatched free of cost to universities/colleges/high schools besides scientific research organizations, learned bodies.

9. AWARDS

The Foundation released a sum of Rs. 10,000/- to Pakistan Association for Computer Education in Schools for the year 1990-91 to be given to the best school/team working in computers. The 1990 award has been given to Fazal-e-Haq College, Mardan.

10. SCIENCE CARAVAN PROJECT

During the report period, the three science caravan units remained actively involved in arranging science exhibition in the schools of their respective provinces i.e. Federal Area/Punjab, Sindh and NWFP.

The Science Caravan Unit for Federal Areas after successfully completing the Federal Area, initiated its activity of arranging Science Exhibition in Rawalpindi Division. The caravan visited the following places.

S. No.	Place	No.of Schools	No. of Students visited
1.	Ausia, Distt: Murree (26.8.90 to 28.8.90	6	1715
2.	Kotli Sattian (29.8.90 to 4.9.90	7	1785
3.	Kallar Syedian, Tehsil Kahuta (22.9.90 to 27.9.90)	4	1580
4.	Govt. Boys High School, Murree (30.9.90)	1	600
5.	Choha Khalsa, Tehsil Kahuta (9.2.91 to21.3.91	38	6513
6.	Fauji Foundation College, Rawalpindi (11.5.91 to16.5.91)	2	2500
7.	Wah Cantt: (18.5.91 to 1.6.91)	10	3260

The Science Caravan Unit for NWFP also organised science caravan exhibitions at the following places.

S. No.	Place	No.of Schools	No.of Students
1.	Madyan, Distt: swat (16.8.90 to 27.8.90)	8	1200
2.	Islamia Collegiate School Peshawar		32 trainee teachers
3.	Doaba, Tehsil Hangu. (11.10.90 to18.12.90)	10	1000
4.	Swabi (10.12.90 to18.12.90)	10	2000
5.	Fazal Haq College, Mardan (13.1.91to 15.1.91	3 (sections)	653
6.	Baghdada, Distt: Mardan (17.1.90)	1	100
7.	Lakki, Distt: Bannu (4.5.91 to 16.5.91	16	1350
8.	Nawansher, Distt: Abbotabad. (9.6.91 to 19.6.91)	10	1350

The Science Caravan Unit for Sindh could not arrange its exhibitions within the province due to disturbance prevailing in Hyderabad at that time. The office of the caravan was then shifted to Sukkur from Hyderabad in June, 1990 and was stationed temporarily in a school provided through the courtesy of the Board of Intermediate & Secondary Education, Sukkur. A house was then hired for the Sindh Unit in January, 1991, but the condition did not favour the unit to arrange science exhibition in the schools.

The Sindh unit arranged its exhibition at the Govt..Boys High School, Sukkur w.e.f. 11.6.1991 to 20.6.1991 for the Education Officers of the Directorate of Education, Sukkur, Headmasters/Headmistress and teachers of schools of Distt: Shikarpur, Khairpur and Sukkur. The local students also witnessed the exhibition and showed great interest. A porgramme has been chalked out for arranging Science Caravan Exhibition in the schools of Dist: Sukkur w.e.f. 23.9.91 to 24.10.91 for girls students, and from 10.11.91 to 30.12.91 for boys.

The Science Caravan Unit for Balochistan could not be launched in 1990-91 due to ban imposed by the Government on the appointments of staff.

The Science Caravan Unit for Punjab has been fully constructed and its equipment purchased but could not be launched because of the Government ban on recruitment of staff.

During the current fiscal year 1990-91, only an amount of Rs.0.350 million has been allocated by the Government for the ADP project "Operation of Science Caravans". Both these caravans cannot be put into operation due to paucity of funds. The operational activity of the existing two caravans for Sindh and NWFP shall also be affected.

11. SCIENCE POSTERS PROJECT

The 4th Science Posters Set was distributed to all the 6000 high schools in the country and many R&D institutions. Work was initiated to prepare the 5th science posters set which included the following topics.

1. آسمان اور برج
2. ریلوے انجن
3. موٹر کار
4. دیمک
5. ہوائی جہاز
6. Zoonoses — پاکستان کی دریائی مچھلیاں
7. معدنیات کی سختی
8. پن بجلی گھر
9. Portrait of Muslim Scientist "Nasir al-Din al-Tusi"
10. Portrait of Muslim Scientis "Abul Wafa Muhammad al-Buzjani".

Portraits of the two muslim scientists: Ibn- Rushd and Abu al-Nasr al-Farabi were painted for poster set 1991.

Tenders were invited for printing of posters and manufacture of their corrugated boxes. The work was assigned to the lowest bidder M/S Anwar Chaudhry & Company, Rawalpindi, who have partially completed the assignment.

12. 4TH INTER BOARD SCIENCE POSTERS CONTEST

The 3rd Inter Board Science Posters contest was held on 1.12.1990 in the Foundation. The judges unanimously decided as follows:

S.No	Name of Student	Prize	Amount
1.	Mr. Nusrat Iqbal Bhatti, PAF Inter College, Masror, Karachi-13.(Federal Board of Intermediate & Secondary Education, Islamabad.	Ist	Rs. 2000/-
2.	Mr. Babar Baluch, Public School, Hyderabad. (Board of Intermediate & Secondary Education, Hyderabad.	2nd	Rs. 1200/-
3.	Miss Shagufta Naureen, Govt. Girls Pilot Secondary School, Sargodha. (Board of Intermediate & Secondary Education, Sargodha)	3rd	Rs. 800/-

The prize money was sent to the Boards for award to the winning student.

The fourth poster contest was announced by the Foundation in January, 1991. The theme of the contest was "Science & the Environment". The last date of receipt of posters from the Boards of Intermediate and Secondary Education was fixed as 15th April, 1991.

Nine Boards of Intermediate and Secondary Education participated in the contest and sent their best three posters for inclusion in the contest. Prize money of Rs.1000/- (1st prize), Rs. 600/- (2nd prize) & Rs. 400/- (3rd prize) to the students securing positions in the Inter Board Science Posters Contest have also been sent.

13. INTRA BOARD SCIENCE ESSAY COMPETITION

On the request of Boards of Intermediate & Secondary Education, the last date of receipt of essay in the 2nd Intra Board Science Essay Competition was extended by the Foundation from 15.5.1990 to 15.8.1990. Seven Boards of Intermediate & Secondary Education organized the essay competition and sent their best three essays to the Foundation for the award of prize money. Prize money amounting to Rs.500/-(1st prize), Rs. 300/- (2nd prize) & Rs. 200/- (3rd prize) were sent to each Board for distribution among the prize winning students.

The 3rd Intra Board Science Essay Competition for the year 1990-91 was announced by the Foundation in December, 1990. The Boards were requested to send their essays latest by 15th April, 1991. Nine Boards of Intermediate & Secondary Education submitted the best three essays for award of prizes. The prize money has been sent to all the Boards for distribution among the prize winning students.

PAKISTAN MUSEUM OF NATURAL HISTORY (PMNH)

The four Divisions of PMNH namely, Botanical, Zoological, Earth Sciences and Public Services remained actively engaged in their assigned programmes.

The scientists were involved in building up a comprehensive reference collection in their sections. They took part in different scientific expeditions independently and also in collaboration with other national and international organizations. As a result of these endeavours they were able to publish a number of research articles in various journals both within and outside the country. Moreover, the Museum is now publishing its own bulletin entitled "Natural History Bulletin".

Public Services Division remained busy in promoting public awareness about different scientific concepts and problems of national concern, through well planned exhibits. This Division also designed scientific publications and other official printing material. In addition to it, this section organized guided trips of various educational institutions to the Museum. At the Marghazar Display Corner various scientific films were regularly shown to the visitors to enhance their knowledge, arouse their curiosity and awaken their creative spirit. PMNH continued its national and international liaison. Work on the establishment of a natural history section at National Museum of Science and Technology Lahore continued during the year under review, while scientists from Japan, USA and England worked on various scientific fields with their counterparts at PMNH.

Construction of the new PMNH building also continued, although at a relatively slow pace.

A summary of the activities during the year 1990-91 is given below:-

1. BOTANICAL SCIENCES DIVISION

a) Reference Collection

A total of seven extended trips to Swat, Kaghan, Chitral, Azad Kashmir and areas around Islamabad were undertaken. Additional trips to Northern Areas with the visiting Japanese team were in progress. A total of 3082 specimens of higher plants and ferns, 500 algae and 382 fungi and some soil samples were collected.

b) Laboratory Work

Curated and preserved 2,250 plant specimens, 2,070 were mounted, 300 were labelled. As regards identification, 928 higher plants, 235 fungi and 94 algal specimens were identified while 23 plant communities were established.

c) Extension work and Services Rendered to other Organizations

Identified 560 plant specimens for the students of various colleges of Rawalpindi - Islamabad. Prepared write-ups pertaining to all plant exhibits in the National Museum of Science and Technology's Natural History Section.

A team of PMNH and Japanese botanists visited Northern Areas of Pakistan in connection with the joint PMNH - Japan National Museum's Collaborative Programme on "Cryptogamic Flora of Pakistan".

d) Publications

Marwat, Q. and Z.K. Shinwari (1990). A checklist of the flora of Maslakh Range, Pishin, Baluchistan, Pakistan. Biologia 30(1):71-74.

Shinwari, Z.K. and Bano, F. (1990). History of cultivation in Pakistan. Journ. of Pak. Study Centre, Peshawar No.19 & 20:53-58.

Laghari, M.K. (1990). Uses of diatoms to man and their role in nature. Surit IV.12:41-42.

Ahmad, S. (1990). Trees causing pollen allergy in Pakistan. Pak. Journ. Med. Res. 29(4):204-208.

Laghari, M.K. (1991). Economically important plants of Pakistan. Surit V-3(4-5).

2. EARTH SCIENCES DIVISION

a) Reference collection

As many as 9 trips were conducted during report period. Areas around Swat, Malakand, Peshawar, Kalabagh, Mianwali and D.G. Khan were surveyed. The trip to D.G. Khan was in collaboration with Dr. E.H. Lindsay of Arizona University, USA. A total of 482 samples of rocks, minerals and fossils were collected.

b) Laboratory work

As a result of washing and sieving, 1500 micro fossils were isolated. 136 rocks and mineral samples were analysed. Thin sections of 77 samples were made and the porosity of 90 samples was studied. 175 samples were subjected to petrographic studies.

c) Extension work and Services Rendered to other organizations:

Fossils/rocks to be displayed at the Natural History Section of National Museum of Science and Technology, Lahore (NMST) were identified. Technical assistance regarding preparation of model/exhibit of Solar System at NMST. Write-ups for the science posters of Pakistan Science Foundation's science popularization programme were also prepared.

d) Publications:

Kazmi, A.H., J. Anwar, S. Hussain, T. Khan and H. Dawood (1989). Emerald deposits of Pakistan. In Emeralds of Pakistan. A.H. Kazmi and I.W. Snee (edts.) pp.39-74.

Baqri, S.R.H., G. Roohi and M. Sarwar. (1991). On the discovery of ostrea bed (bivalvae) at the base of Patala Formation. Proceedings of the 11th Pakistan Congress of Zoology, Khanspur, Murree 25th - 26th May, 1991.

Raza, S.M. and I.U. Cheema (1991). Siwalik Hominoids and other relationship with extinct apes. Proceedings of 11th Pakistan Congress of Zoology, Khanspur, 25th to 26th May, 1991.

Tahir Kheli, R.A. Khan, S. Dongli, P. Yushang, D. Wanming, Z. Yuqvan, S.R.H. Baqri and H. Dawood. (1990) Review of strategraphy of the Upper Hunza Valley (UHV), NW Karakorum, Pakistan Geol. Bull. Univ. Peshawar Vol.23: 203-214.

Baqri, S.R.H. and A.R. Rajpar. (1991). The clay mineral studies of the Khewra sandstone exposed at Khewra, Eastern Salt Range. Geol. Bull. Univ. Peshawar, Vol.24: 203-214.

3. ZOOLOGICAL SCIENCES DIVISION

a) Reference Collection

Five trips to different parts of Pakistan including Mianwali, Chakwal, Muzaffarabad, Kaghan and Kalabagh etc. were undertaken and 975 insects, 43 fishes, 403 herpetiles, 600 molluscs, 74 birds and 23 mammals were collected.

b) Laboratory work

Cataloguing of 100 oligochaets, 50 birds and 20 aquatic oligochaets was done. As regards identification, 100 fresh water invertebrates, 11 marine and 213 molluscs were identified. Skinning of 114 birds was carried out, while taxidermy of 25 animals was completed.

c) Extension work and Services Rendered to other Agencies:

Collection, identification and preservation of animals for NMST project was carried out. Information regarding fauna of Margalla Hills to the committee of Ministry of Science and Technology was provided. A plan for the establishment of Wild Life Museum under the auspices of Punjab Wildlife Department was also prepared. A collaborative research project with USA counterparts "Herpetology of Pakistan" was underway.

d) Publications:

Hasan, S.A. (1990). Fine structure of pretarsus in pentatomid bugs. Proc. Pak. Congr Zool. Vol.10:17-20.

Hasan, S.A. (1991). Uptake of estrogen by the uterus of albino rats in the presence of copper intra-uterine device.

Hasan, S.A. (1990). Fine structure of external scent gland system in pentatomids (Heteroptera: pentatomidae) Pak. J. Zool.22(2):167-170.

Hasan, S.A. (1990). Fine structure of labium in the pentatomidae with special reference to phylogeny. Proc. Pak. Congr. Zool. 9:147.

Sahibzada, S.S. and M. Afzal (1990). Muscicapid birds of Hunza. Biologia 36:71-74.

Hasan, S.A. and M. Afzal (1990). Studies of the genus Dolycoris Mulsant & Rey (Pentatomidae : Corpocorini) with description of four new species from Pakistan. Biologia 30(1):57-63.

4. PUBLIC SERVICES DIVISION:

a) Museum Display and Maintenance

Following display assignments were completed:

Prepared 9 models of fishes and fixed in the marine diorama. A scheme consisting of plans, drawings and cost estimate for ticket booth at Display Corner was prepared. Three different visual proposals were prepared for Museum brochure. Colored illustrations of Asian Elephant and Blue Whale were prepared for the write-up panels of "Display Corner". Final design of the title page of Newsletter was prepared. Prepared a display idea on "Human Blood Sugar Regulation by Pancreatic Hormones". A scheme for the celebration of International Earth Day for Children was prepared and Marghazar Display Corner was also renovated.

New write-ups were prepared for 'Elephant' display carried out modifications for the pamphlet/leaflet of on "Mammals which lived in the past and their present status in Pakistan". Printing of PMNH brochure was done and the visual of Natural History Bulletin was designed and prepared.

b) Educational Activities

Film shows were arranged for different schools of Rawalpindi - Islamabad. A total of 65 guided tours were provided with information regarding plants, animals, fossils, minerals etc. displayed in the main Museum building. An exhibition of PMNH at the workshop on "Wildlife in Islamabad" was arranged.

Participated in the preparation of TV documentary about "Butterflies and Higher plants".

c) Services Rendered to other Agencies:

The services were provided to various organisations as under:

i) Natural History Section at National Museum of Science and Technology, Lahore

- Establishment of Natural History Section at NMST Lahore has been undertaken. Following assignments were completed during the report period.
- A small model of Natural History Section at NMST was completed.
- Completed coloured sketches/visuals of ecosystems of Temperate, Riveraine and other zones of Punjab province.
- A video film was exposed and coloured photography was carried out during all the tours to field pertaining to above mentioned project.
- Prepared and submitted write-ups of "Man and Environment", and other displays.
- Preservation of specimens of plants, animals and fossils was done for NMST displays.

ii) Pakistan Science Foundation

Fifth set of posters for science popularization programme was prepared and 200 colored slides for the same were exposed.

d) Number of visitors:

Museum Building	13,246
Display Corner Marghazar	134,930

PAKISTAN SCIENTIFIC AND TECHNOLOGICAL INFORMATION CENTRE (PASTIC)

INTRODUCTION

Pakistan Scientific and Technological Information Centre (PASTIC) formerly known as Pakistan National Scientific and Technical Documentation Centre, (PANSDOC) was established in 1957 and placed under the administrative control of Pakistan Council of Scientific and Industrial Research (PCSIR) at Karachi .The centre worked there upto 1973 and was transferred at Islamabad in 1974 with the name of Pakistan Scientific and Technological Information Centre (PASTIC) and placed under the administrative control of Pakistan Science Foundation.

LOCATION

- National Centre, Islamabad.
- Sub Centre, Lahore.
- Sub Centre, Karachi.
- Sub Centre, Peshawar.
- Sub Centre, Quetta.

OBJECTIVES

i. To collect, organise, classify & disseminate information in all disciplines of science and technology to the scientific community of Pakistan.

ii. To develop inter-library cooperation for sharing of resources.

iii. To establish and maintain links with international/regional information networks. agencies.

iv. To train information specialists in modern information handling and management techniques.

v. To develop and strengthen the National Science Reference Library.

vi. To collect data on S&T information.

PASTIC caters to the S&T Information needs of scientists and technologists of about 400 S&T Research Institution of Pakistan. .

The Pakistan Scientific and Technological Information Centre under the aegis of Pakistan Science Foundation continued providing services of varied nature to fulfill the demand of R& D Sectors in the country. The activities carried out in terms of targets set by PASTIC & the achievements made are produced below:-

1. DOCUMENTATION DIVISION

a) Document Procurement and Supply Service:

A total of 1387 research articles were supplied against 2079 requests received in the National Centre and four Sub-centres of PASTIC. Out of 1387 references 308 from foreign sources and 1079 from local libraries were processed and supplied to the clients .

			Article Supplied			
New orders Received.	**orders Canceled**	**Total Orders**	**Foreign**	**Local**	**Total**	**Orders Under Process.**
2079	178	1901	308	1079	1387	514

b) Bibliography Service:

Thirty (30) subject bibliographies comprising of 1338 references were prepared and supplied to the clients.

c) Abstracting and Indexing Services

PASTIC publishes a quarterly journal viz.; Pakistan Science Abstracts which reports abstracts of research articles published in recent S&T research journals of Pakistan:

i) **PSA 1989 Vol 29 No. 2:** The manuscript of PSA 1989 vol.29 No. 2 consisting of 152 abstracts is under printing.

ii) **PSA 1989 Vol. 29 No.3:** Text, Keyword Index, Author Index, Content List & List of Journal was composed and finalised.

iii) **PSA 1989 Vol.29. No.4:** The material of PSA 1989 Vol. 29 No. 4 is being composed on Computer.

iv) **PSA 1990 Vol. 30 No. 1**: 75 abstracts were classified according to UDC numbers.

d) Union Catalogue:

An action plan for compilations of National Union Catalogue was prepared and 30 major libraries were requested to provide data of their serial holdings. The data of periodical holdings of 29 libraries was collected and computerized.

2. PASTIC NATIONAL SCIENCE REFERENCE LIBRARY:

a) About 2204 issues of various S&T periodicals, 197 miscellaneous documents and 172 books were received in the libraries of PASTIC National Centre and Karachi Centre. Library service was provided to scientists, researchers and PASTIC staff.

b) The number of references supplied to the library users was 946.

c) "Current Arrivals in PASTIC Library" a monthly publication from July, 1990-June, 1991 were prepared.

d) 735 documents bibliographic data was computerized.

3. INTERNATIONAL LIAISON

a) Environmental Information: UNEP/INFOTERRA:

i) The Annual Report for January-December, 1990 of INFOTERRA Services rendered by PASTIC was provided to UNEP/INFOTERRA, Nairobi.

ii) Twenty organisations were contacted for registration in INFORTERRA International Directory of Sources. Response of 7 organisations received.

b) WHO/CEHANET (Database)

i) 270 records were entered in the CEHANET National database.

ii) 112 data entry sheets were sent to CEHA for the CEHANET Regional database.

iii) Information was provided to WAPDA on Wildlife Conservation Strategy, Planning Division and Pakistan Council of Research in Water Resources in the field of Environment Water Supply and Sanitation.

iv) Newsletter ENVIRONET NEWS

v) Some 8-9 issues of ENVIRONET NEWS were produced and mailed out to 415 individuals interested in environmental health science.

vi) CEHA Current Content Service:

vii) Current content pages were distributed to 75 users in selective subjects.

viii) A memorandum of understanding was signed between PASTIC and WHO's Centre for Environmental Health Activities, Jordan for cooperation in areas like exchange of information, database development, compilation of directories, training etc.

ix) CEHA proposed to conduct a National Workshop on CEHANET procedures in Lahore in September, 1991. The Working paper for the Workshop was prepared and sent to PSF for approval.

c) ASTINFO/UNESCO/PGI

i. Against a contractual grant from ASTINFO a 9 days training course on MICRO CDS/ISIS was organised in Karachi from 15-24 Dec. 1990.

ii. The following two project proposals were prepared for submission to UNESCO under the participation Programme:-

- Training Course on Version 2.3 of CDS/ISIS.
- Applied Science & Technology Index on CD-ROM.

iii. Some 7 organisations provided project proposal upon request. These alongwith PASTIC proposals were incorporated in the Country Report prepared for the 8th ASTINFO Consultative meeting in Tokyo.

d) SAARC Documentation Committee: (South Asian Association for Regional Cooperation)

SAARC/TCDC: A proposal was prepared and submitted for approval to the Pakistan Science Foundation regarding training in India in Computer Installation.

4. REPROGRAPHIC SERVICES

Printing

a) 3152799 printing impressions, 6920 pages and 80167 copies were produced on account of various jobs of following S&T Organisations.

No.	Organisations	Job completed
1.	Quaid-i-Azam University	7
2.	Pakistan Science Foundation	9
3.	Ministry of Science & Technology	15

4.	NIST	4
5.	Pakistan Museum of Natural History	5
6.	COMSTECH	1
7.	NADLIN	1
8.	PMRC	4
9.	PCAT	3
10.	PFFA	1
11.	PVMA	4

b) Photocopying/Duplication

33185 pages of photocopies and 3450 pages of duplication were produced by the PASTIC Reprography Unit.

5. COMPUTERIZATION ACTIVITIES:

Different software such as Word Star, Word Perfect, Dbase II, Dbase IIIP, Micro CDS/ISIS and VENTURA were used to produce following information service.

a) 8-9 issues of Newsletter ENVIRONET NEWS were composed.

b) 3320 records of Canadian Patents available in PASTIC were computerised.

c) The data of Periodical Serial Holdings of 36 Libraries comprising of 1106 records were computerized.

d) 30 subject bibliographies comprising of 1338 references were computerized.

e) Pakistan Science Abstracts (Quarterly Publication). 1989, Vol. 29(2-3)

f) Computer software and Desk-top publishing services/facilities were provided to other S&T organisations.

g) Computer Training Courses:

During the period under review PASTIC conducted the following two training courses on the use of CDS/ISIS in library automation and database development.

i) Course on CDS/ISIS (3-8 November 1990)

This course was held in PASTIC. Five participants from S&T organisations in Islamabad and Rawalpindi attended the course.

ii) PASTIC-NIDP-ASTINFO Joint Training Course on CDS/ISIS (15-24 December,1990)

This course was organised in Karachi and attracted a large number of librarian organisations. The course was sponsored by ASTINFO/UNESCO. Some 27 librarians were trained on CDS/ISIS.

6. TECHNOLOGY INFORMATION:

The monthly bulletin Technology Information was produced based on information on various technologies collected from 27 countries. The mailing list for the bulletin comprised of 251 industrial and technical enterprises/entrepreneurs in public and private sectors.

7. DEVELOPMENT PROGRAMME OF PASTIC

The Development Programme has been carried out in the following three areas:-

a) Strengthening of PASTIC National Science Reference Library

Library project was approved for a period of 3 years at the cost of Rs. 4.00 million for the purchase of primary and secondary journals, reference jobs, etc. An amount of Rs. 0.190 million was provided in 1990-91 which was fully utilized during the report period. 14 books were purchased and 28 S&T journals were subscribed.

b) Current Contents Service

The C.C.S. project of 2 years duration was sanctioned at the cost of Rs.0.2 million. Based on the outcome of a survey of 1000 scientist/researchers, the Current Contents Service was provided each month to 335 individual scientists in the fields of Biology, Chemistry, Microbiology, Computer Science, Biochemistry, Earth Science, Mathematics, Physics and Technology. As many as 427 articles were supplied on demand to scientists during the period under report. This project has ended on 30-06-91. The service has proved very useful for the scientists/researchers. In order to continue the service in the vital interest of the users, a case has been submitted to the higher authority for perusal of funds on recurring bases.

c) Setting up Database Facility at PASTIC

The project was approved at a cost of Rs. 2.209 million for a period of 3 years. An allocation of Rs. 0.096 million received during 1990-91 was fully utilized for purchase of a laser printer and its accessories.

CHAPTER 2

ORGANIZATION AND ADMINISTRATION

The organizational structures of the Pakistan Science Foundation, Pakistan Museum of Natural History and Pakistan Scientific & Technological Information Centre are given on the forth coming pages.

The staff position in the Foundation, PMNH & PASTIC during the period was as under:

PAKISTAN SCIENCE FOUNDATION

Sr. No.	Designation	Number
1.	Chairman	1
2.	Member (Science)	1
3.	Member (Finance)	1
4.	Chief Scientific Officer	1
5.	Secretary	1
6.	Principal Scientific Officer	2
7.	Senior Scientific Officer	3
8.	Senior Research Officer	1
9.	Deputy Director (F&A)	1
10.	Deputy Secretary	1
11.	Science Promotion Officer	1
12.	Administrative Officer	1
13.	Accounts Officer	1
14.	Assistant Director (Budget, CP Fund and Pension)	1
15.	Research Officer	1
16.	PS to Chairman	1
17.	Librarian	1
18.	Scientific Officer	6
19.	Internal Audit Officer	1
20.	Caravan Incharge	5
21.	Graphic Artist	2
22.	Superintendent	1
23.	Assistant Research Officer	1
24.	PA to Chairman	1
25.	Mechanic for Instrument	1
26.	Assistant Scientific Officer	1
27.	Accountant	1
28.	Supporting Staff	125
	Total :	165

PAKISTAN MUSEUM OF NATURAL HISTORY (PMNH)

S.No.	Designation	Number
1.	Director General	1
2.	Director	3
3	Curator	3
4.	Associate Curator	11
5.	Product Designer	1
6	Research Associate	21
7	Artist	1
8.	Administrative Officer	1
9.	Accounts Officer	1
10	Librarian	1
11.	Taxidermist	2
12.	Associate Artist	2
13.	Teacher Guide	1
14.	Superintendent	1
15.	Accountant	1
16.	Stenographer	1
17	Casting Staff	1
18	Modeller	1
19	Children Education Programmer	1
20.	Stenotypist	3
21.	Calligrapher	1
22	Assistant Artist	2
23.	Fossil Preparator	1
24.	Photographer	1
25.	Office Assistant	1
26.	Purchase Assistant	1
27	Accounts Assistant	1
28	Cashier	1
29.	Senior Collection Incharge	2
30.	Key Punch Operator	1
31.	Incharge Embalming	1
32.	Skeleton Preparator	1
33.	Collection Incharge	2
34.	Drying & Fumigating Assistant	2
35.	Tracer	1
36.	Electrician	1
37.	Lathe Machine Operator	1
38.	Painter	1
39	U D C.	2
40	Store Keeper	1
41.	Field Assistant	12
42	L D C	2
43.	D M O	1
44.	Dispatch Rider	1
45.	Driver	5
46.	Naib Qasid	8
47.	Guard	4
48.	Helper	4
49	Gardener	1
50.	Chowkidar	10
51	Sanitary Worker	5
	Total Posts	**136**

PAKISTAN SCIENTIFIC AND TECHNOLOGICAL INFORMATION CENTRE (PASTIC)

S.No.	Designation	Number
1.	Director	1
2.	Deputy Director (Doc.)	1
3.	Manager Reprographic Unit	1
4.	Senior Administrative Officer	1
5.	Senior System Analyst	1
6.	Senior Documentation Officer	1
7.	Senior Information Officer	1
8.	Senior Librarian	1
9.	Chief Editor	1
10.	Chief Liaison Officer	2
11.	Scientific Information Officer	3
12.	Admin. Officer (Karachi)	1
13.	Printing Officer	1
14.	Graphic Artist	1
15.	Translating Officer	1
16.	System Analyst	2
17.	Liaison Officer	2
18.	Manager Technology Information	1
19.	Accounts Officer	1
20.	Patent Officer	1
21.	Assistant Documentation Officer	2
22.	Assistant Manager Reprographic Unit	1
23.	Assistant Scientific Information Officer	4
24.	Assistant Programmer	3
25.	Superintendent (Admin.)	1
26.	Superintendent (Reprographic Unit)	1
27.	Accountant	1
28.	P.A. To Director	1
29.	Supporting Staff	91
	Total:	**130**

CHAPTER 3

AUDITOR'S REPORT

AKBAR & CO
CHARTER ACCOUNTANTS

We have examined the annexed Balance Sheet of "PAKISTAN SCIENCE FOUNDATION" as at June 30, 1991 and the annexed Receipt & Expenditure Account for the year ended June 30, 1991 and report that:

(a) We have obtained all the information and explanations which were necessary for our audit;

(b) The Balance Sheet exhibits true and fair view of the state of the Foundation's affairs according to the best of our information and explanations given to us and as shown by the books of Foundation;

(c) The Receipts of the Foundation during the year ended June 30, 1991 comprise of grants received for the Federal Government and we are satisfied that grants so received have been utilized for the objects for which these were made within the specified time limit and there were no unspent balance except for expenses incurred but not paid upto June 30, 1991. We are also satisfied of disbursements made from the grants.

LAHORE: 65 SHAHRAH-E-QUAID-E-AZAM
DATED 05TH OCTOBER, 1991

SD-
AKBAR & CO,
CHARTERED ACCOUNTANTS.

AKBAR & CO
CHARTERED ACCOUNTANTS

PAKISTAN SCIENCE FOUNDATION, ISLAMABAD
NOTES TO THE ACCOUNTS AS ON JUNE 30, 1991

1. **Accounting Policies**:

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

A- **Grants Received**

Grants from the Government of Pakistan have been accounted for on receipt basis.

B- **Research Support Grant**

Research Support Grant has been accounted for on payment basis.

C- **Fixed Assets**

1. Fixed assets have been valued at cost less accumulated depreciation except lease-hold land which valued at cost;

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

D- **General**

Figures have been rounded off to the nearest rupee.

2. **General Fund**:

		1991 Rupees	1990 Rupees
	Movements in the accounts during the year are as follows:		
	Balance as on July 1	6,433,050	6,433,335
Add:	Grant received from Government of Pak		
	Non-Development Grant	14,950,000	14,337,000
	Development Grant	2,338,000	2,183,352
		23,721,050	22,953,687
	Less: Expenditure	17,537,152	16,520,637
		6,183,898	6,433,050

3. **Research & Support Grant**

The made up is as under:	1991 Rupees	1990 Rupees
Balance as on July. 1	21,930,301	22,019,746
Add: Disbursed during the year (3.1)	5,559,727	4,535,824
	27,490,028	26,555,570
Less: Projects completed during (3.2) the year.	5,444,787	4,625,269
	22,045,241	21,930,301

3.1 In accordance with principles out lined charter grants aggregating Rs.5,559,727 have been paid by the Foundation during the year for conducting of various approved scientific research projects as detailed below:

Medical Science	148,851	12,001
Chemical Science	844,165	1,420,820
Agricultural Science	563,728	377,350
Biological Science	693,324	914,279
Earth Science	307,546	651,940
Environmental Science		200
Engineering Science	202,524	121,710
Physical Science	2,217,984	773,885
Institutional Support	367,400	55,000
Board Committee Meeting	89,874	35,934
Math & Computer Science	124,331	172,705
	5,559,7274	535,824

3.2	**Projects Completed During the Year**	1991 Rupees	1990 Rupees
	Agricultural Science	--	402,221
	Biological Science	872,808	815,289
	Chemical Science	2,859,355	1,272,940
	Engineering Science	--	124,741
	Medical Science	--	40,395
	Earth Science	439,684	888,078
	Mathematical Science	--	22,156
	Physical Science	1,272,940	1,059,449
		5,444,787	4,625,269

3.2.1 The remittances sent to the following projects remained unconfirmed in the absence of expenditure confirmation report of Universities.

Project No.	Project Title	Duration	Expt. (RS)
S-KU/ BIO(166)	Screening and isolation of metal resistant bacteria to be used for environmental protection.	10-11-88 to 31.10.90	307,632
S-SU/ CHEM (172/1)	Application of high performance liquid chromatography for multielemental analysis at trace level using to Ketominesebitt basis	31-07-89 to 01-06.90	89,813

4.	**Current Liabilities**			
	Audit Fee	(4.1)	27,100	14,600
	Expenses	(4.2)	44,592	41,909
	Payable to Contractors.		6,500	24,796
	Prior Year's Adjustment.	(4.3)	19,604	--
			97,796	81,305

4.1	The made up of audit fees payable is as under:	1991 Rupees	1990 Rupees
	-M. Hussain Chaudhry & Co. Chartered Accountant Lahore.	9,000	
	-Nazir Chaudhri & Co. Chartered Accountants Lahore for accounting 1987 - 88.	5,600	
	-Akbar & Company, Chartered Accountants, Lahore for accounting 1990-91.	12,500	
		27,100	

4.2 Expenses payable represent the amount of telephone and gas amounting to Rs. 44,435 and Rs. 157 respectively.

4.3 This adjustment is discussed in Note 7.1.

5. **Research Projects In Progress**

This represents the expenditure incurred on various research projects which appear contra on liability side under the head "Research Support Grant".

6. **Accounts Receivable**

UNESCO Coupons	105,929	85,000

7. **Advances, Deposits & Prepayments**

The made up is as under:

Advance to Staff	60,088	49,800
Deposits	5,500	5,500
Advance Rent	649,424	673,000
	715,012	728,300

7.1 There was difference amounting to Rs. 19,604 between Advance to Staff Register and detail provided to us. The difference was adjusted by debiting advance to staff and crediting prior year's adjustment under the head of "Expenses Payable"

8. **Cash And Bank Balances**		1991 Rupees	1990 Rupees
Cash in Hand	(8.1)	23,292	28,516
UNESCO Coupons	(8.2)	341,936	246,630
National Bank of Pakistan (A/C.No.52)		6,500	24,799
		371,728	299,945

8.1 Cash in hand was not physically verified by us as on June 30, 1991. However we have relied upon the certificate provided by the management of its physical existence as on June 30, 1991.

8.2 UNESCO coupons in hand were not physically verified by us as on June 30, 1991. However, we have relied upon the certificate provided by the management of its physical existence as on June 30, 1991.

9. **Grants**		
Research & Support.	5,559,727	4,535,824
Scientific Societies & Professional Bodies.	560,000	644,500
Scientific Conferences, Meetings and Seminars.	466,933	434,756
	6,586,660	5,615,080

10. **Development Grant**

This represents the grant received as aid from United States National Science Foundation of American Projects PL-480 through Government of Pakistan. Following payments were made during the year:

			1991 Rupees	1990 Rupees
a)	1.	Chromosome number of vascular Plants.	260,000	300,000
	2.	Bisbenzylisoquinoline Alkaloid.	-	83,351
b)		Operating of Science Caravan (Received from Government of Pakistan.	962,000	900,001
		Construction & Equipment of Science Caravan.	1,116,900	900,000
			2,338,000	2,183,352

11. **Travel Grant For Scientists**

Visit of Scientists & Technologists.	94,755	162,230

12. **Other Functions**

Science Centres & Herbaria	387,772	910,068
Information & Documentation	36,201	118,767
Awards, Prizes & Fellowships.	40,000	67,000
International Liaison	108,389	172,507
Collection of Statistics	11,158	--
Science Promotion Activities	831,637	345,521
Scientists Pool	--	11,642
	1,415,157	1,625,505

13. **Administrative Expenses**	1991 Rupees	1990 Rupees
Salaries & Other Benefits	4,120,615	3,905,930
Traveling Expenses	112,508	155,588
Rent	1,172,659	1,406,731
Electricity, Gas & Water	129,123	96,736

Postage, Telegrams & Telephone	560,082	386,956
Printing & Stationery	63,809	70,010
Vehicle Running & Maintenance	371,224	290,610
Newspapers & Periodicals	19,812	12,500
Liveries & Uniforms	12,295	2,210
Entertainment	21,955	20,156
Repairs & Maintenance	115,104	47,183
Miscellaneous	10,567	13,580
Audit Fee	50,000	12,500
Advertisement	1,154	86,244
Ceremony Expenses	--	22,000
Law charges	1,500	--
Depreciation	340,173	405,536
	7,102,580	6,934,470

In the end we convey our thanks for the cooperation extended to us due to which we were in a position to complete the job assigned to us.

AKBAR & CO
CHARTERED ACCOUNTANT

LAHORE: 65-SHARAH-E-QUAID-E-AZAM
DATED: 05 OCTOBER, 1991

M. HUSSAIN CHAUDHRY & CO.
CHARTERED ACCOUNTANTS

PAKISTAN MUSEUM OF NATURAL HISTORY - ISLAMABAD
RECEIPTS AND PAYMENTS ACCOUNT(DEVELOPMENT) FOR THE YEAR ENDED 30-6-1991

RECEIPTS	1991 Rs	1990 Rs	PAYMENTS	1991	1990
OPENING BALANCE			PAYMENT DURING THE YEAR		
Cash in hand	236	149	Laboratory Equipment	295 863	163 747
RECEIPTS DURING THE YEAR	14.620 000	3 500 000	Books and Journals	5 630	8 494
Developments grants			Advance to CDA for Construction of Building	5.900.000	2 650.000
Foreign Exchange Grant (For	--	1.500.000	Advance to PEPAC for		
Import of Scientific Equipment)	14 620.000	5.000.000	Construction of Building	7.671 673	--
			Pay and allowances	658.496	594 324
			Petrol. Oil and Lubricant	27.135	41 305
			Insurance Premium & Token Tax	23.054	18.794
			Repairs of vehicle	35.775	--
			Display Centre	2.610	23 249
				14.620.236	3.499 913
			EXPENSES AGAINST FOREIGN GRANT		
			L C Margin	-	1.500.000
			CLOSING BALANCE		
			Cash in hand	Nil	236
	14.620.236	5.000.149		14.620.236	5.000.149

ACCOUNTANT

ACCOUNTS OFFICER

AUDITORS' REPORT -

We have examined the Receipts and Payments Account of "PAKISTAN MUSEUM OF NATURAL HISTORY (DEVELOPMENT PROJECT)" for the year ended 30th June' 1991 and to report that according to the best of our information and explanations given to us we have found the same to be in order in accordance with the books of accounts produced to us We are satisfied that the amount of grant shown in the statement of account has been spent on the objects for which it was made with the specified limit We have also satisfied ourselves about the propriety of disbursement made from the grant

53/8 Haider Road.
Rawalpindi
Dated -

(M HUSSAIN CHAUDHURY & CO)
CHARTERED ACCOUNTANTS

M. HUSSAIN CHAUDHRY & CO.
CHARTERED ACCOUNTANTS

PAKISTAN MUSEUM OF NATURAL HISTORY - ISLAMABAD
RECEIPTS AND PAYMENTS ACCOUNT(DEVELOPMENT) FOR THE YEAR ENDED 30-6-1991

RECEIPTS	AMOUNT Rs	TOTAL Rs	PAYMENTS	AMOUNT Rs	TOTAL Rs
OPENING BALANCE			PAYMENTS DURING THE YEAR		
			Salaries and Allowances	3,391,539	
Cash in hand		4,208	Office building rent	554,727	
			Rent of Residential Accommodation	612,125	
RECEIPTS DURING THE YEAR			Entertainment	2,035	
			Newspaper and Periodicals	6,244	
Grants	5,223,000	5,223,000	Telephone	86,077	
			Electric, Gas & Water charges	132,661	
			Advertisement	12,932	
			Postage and telegram	2,056	
			Medical charges	-	
			Audit fee	4,00	
			Traveling expenses	12,487	
			Consumable stock & Stationery	77,884	
			P O.L/Repair	54,418	
			Overtime	17,202	
			Repair and Maintenance O E	27,780	
			C.P.F Contribution	202,060	
			G.L I. Contribution	8,647	
			Office equipment	3,020	
			Furniture and Fixture	4,624	
			Uniform and Liveries	2,961	
			Ground rent to C.D.A.	-	
			Miscellaneous	7,475	5,222,954
			CLOSING BALANCE		
			Cash in hand		4,254
		5,227,208			5,227,208

ACCOUNTS OFFICER

ACCOUNTANT

AUDITORS' REPORT -

We have examined the Receipts and Payments Account of "PAKISTAN MUSEUM OF NATURAL HISTORY (DEVELOPMENT PROJECT)" for the year ended 30th June' 1991 and to report that according to the best of our information and explanations given to us, we have found the same to be in order in accordance with the books of accounts produced to us We are satisfied that the amount of grant shown in the statement of account has been spent on the objects for which it was made with the specified limit We have also satisfied ourselves about the propriety of disbursement made from the grant

53/8 Haider Road,
Rawalpindi
Dated.-

(M. HUSSAIN CHAUDHURY & CO)
CHARTERED ACCOUNTANTS

M. HUSSAIN CHAUDHRY & CO.
CHARTERED ACCOUNTANTS

PAKISTAN MUSEUM OF NATURAL HISTORY - ISLAMABAD
RECEIPTS AND PAYMENTS ACCOUNT FOR THE YEAR ENDED 30TH JUNE' 1991
C D ACCOUNT NO. 70 U B L

RECEIPTS	AMOUNT Rs.	TOTAL Rs	PAYMENTS	AMOUNT Rs	TOTAL Rs
OPENING BALANCE			PAYMENTS DURING THE YEAR		
Cash at United Bank Limited	53.869	53.869	Vehicle repairs	2.031	
RECEIPTS DURING THE YEAR			L C Margin deposited in S B P	53.245	
C P F Loans from P S F	109.283		Electricity Bills	10.404	
P S.F Projects	177.575		Rent in Advance Residential	35.400	
Travel grant from P.S F	33.601		Accommodation		
Rent grant from P S F.	100.000		Rent in Advance Office Building	100.000	
Refund of Rent Advance-DG's	35.400		Advance for purchase of Lab	3.000	
Accommodation			Supplies		
L C Margin Un-utilised from N B P	53.245		Telephone shifting charges	1.000	
Miscellaneous receipts	3.110	512.214	Bank charges	25	205.105
			C P F Loans	109.283	
			P S F. Projects	212.575	
			Travel Grant - Product Designer	33.601	355.459
			CLOSING BALANCE		
			Cash at United Bank Limited.	5.519	5.519
		566.083			566.083

ACCOUNTANT ACCOUNTS OFFICER

AUDITORS' REPORT -

We have examined the Receipts and Payments Account of "PAKISTAN MUSEUM OF NATURAL HISTORY ISLAMABAD C D ACCOUNT NO 70 U B L" for the year ended 30th June' 1991 and to report that according to the best of our information and explanations given to us. we have found the same to be in order in accordance with the books of accounts produced to us

53/8 Haider Road.
Rawalpindi
Dated:-

(M HUSSAIN CHAUDHURY & CO)
CHARTERED ACCOUNTANTS

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 there to,

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 be the said name sue and be sued.

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

4. FUNCTIONS OF THE FOUNDATION:

1) The Foundation shall function as a financing agency to:-

i) the establishment of comprehensive scientific and technological information and dissemination centres,
ii) the promotion of basic and fundamental research in the universities and other institutions on scientific problems relevant to the socio-economic development of the country;

iii) the utilization of the results of scientific and technological research including pilot plant studies to prove the technical and economic feasibility of processes found to be promising on a laboratory scale;
iv) the establishment of science centres, clubs, museums, herbaria and planetaria;
v) the promotion of scientific societies, associations and academies engaged in spreading the cause of scientific knowledge in general or in the pursuit of a specific scientific discipline of technology in particular;
vi) the organisation of periodical science conferences, symposia and seminars;
vii) the exchange of visits of scientists and technologists with other countries;
viii) the grant of awards, prizes and fellowships to individuals engaged in developing processes, products and inventions of consequence to the economy of the country; and
ix) special scientific surveys not undertaken by any other 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 to assist them, in collaboration with the concerned agencies in finding appropriate employment; and
iii) establish liaison with similar bodies in other countries

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

5. BOARD OF TRUSTEES:

1) The general direction, conduct and management of the affairs of the Foundation, including administration of its funds, shall vest in a Board of Trustees consisting of the following members namely;

Whole-time members
i) the Chairman
ii) one Eminent Scientist;
iii) the Director of Finance;

to be appointed by the President

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

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

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

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

8. MEETING OF THE BOARD:- (1) The meeting of the Board shall be held at least ..
and shall be presided over by the Chairman or, in his absence, by its whole-time scientist memb.
All decisions at a meeting of the Board shall be taken by a majority of the votes of the members prese
and voting.

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

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

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

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

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

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

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

15. ACCOUNTS AND AUDIT:

1) The funds of the Foundation shall be kept in a 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 with in the meaning of the Chartered Accountants Ordinance., 1961 (X of 1961) and are appointed by the Foundation in consultation with the Auditor-General of Pakistan.

16. APPOINTMENT OF OFFICERS AND SERVANTS:

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

2) In fixing the terms and conditions of service of its officers and servants, the Foundation shall, as nearly as 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 REPORTS:

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.