

ANNUAL REPORT



**PAKISTAN
SCIENCE
FOUNDATION**

1994-95



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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 1994-95, alongwith its audited accounts, 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).

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Dr. Atique Mufti (Till 2 October 1994)	Member Science
Dr. Munir Ahmed Bhatti (Since 16 April 1995)	
Mr. Nasim Qureshi (From 1 July To 2 October 1994)	Member Finance
Mr. Zafar Ahmad (Since 29 December 1994)	

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2. Dr. Atique Mufti Member Science
(Till 2 October 1994)
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(Since 16 April 1995)
3. Mr. Nasim Qureshi Member Finance
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6. Prof. Dr. G.A. Miana, Department of Chemistry, Gomal University, D. I. Khan.
7. Dr. Abdul Rehman Memon, Vice Chancellor, Mehran University of Engineering and Technology, Jamshoro.
8. Prof. Dr. M. Ayaz Malghani, Department of Zoology, University of Balochistan, Quetta.

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11. Mr. Salim Mehmud, Chief Scientist and Scientific Adviser, Defense Science and Technology Organization, Rawalpindi Cantt.
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14. Dr. N.M. Butt, Director PINSTECH, Nilore, Islamabad.
15. Prof. Dr. Atta-ur-Rehman, Director, H. E. J. Research Institute of Chemistry, University of Karachi, Karachi.
16. Dr. G.M. Khattak, Ex Vice Chancellor, NWFP Agricultural University, Peshawar.
17. Engr. A. Karim Khan, Vice Chancellor, NWFP University of Engineering and Technology, Peshawar.
18. Dr. Ghulam Sarwar Garani, Principal, Bolan Medical College, Quetta.
19. Mr. Aezaz Hussain, Managing Director, Systems (Pvt.) Limited and Member Pakistan Federation of Chamber of Commerce, Lahore.

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ABBREVIATIONS

Province

B	Balochistan
C	Center
F	Frontier
P	Punjab
S	Sindh

Sponsoring Institutions

AC	Agricultural College
AU	Agricultural University
EU	Engineering University
QU	Quaid-i-Azam University
KU	Karachi University
PU	Peshawar University/Punjab University
SU	Sindh University
KMC	Khyber Medical College
NHL	National Health Laboratories
CSIR	Council of Scientific and Industrial Research
JPMC	Jinnah Post-Graduate Medical Center
NIAB	Nuclear Institute for Agriculture & Biology
NIBG	National Institute of Biotechnology and Genetic Engineering

Disciplines

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

EXECUTIVE SUMMARY

PAKISTAN SCIENCE FOUNDATION (PSF)

Pakistan Science Foundation 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 Center (PASTIC). The activities during the year are reflected below.

RESEARCH SUPPORT:

Research Support is the principal programme of the Foundation for the promotion of basic and fundamental research relevant to the socio-economic needs of the country. During 1994-95, a total of 101 projects remained under consideration for funding. Among these, 37 projects were newly received while 64 had been carried over from the previous year. Among these, 27 projects costing an estimated amount of Rs. 5.88 million were sanctioned in the fields of Agriculture, Biology, Chemistry and Physics. In addition, an amount of Rs. 0.545 was released to three organizations as institutional support grant for purchase of laboratory materials and accessories.

Fifty three technical reports including semi-annual and annual reports were received during the year and were assessed. Similarly, 16 studies/projects in various fields were completed and their final reports received and dilated upon in the Technical Committee meetings.

The completed studies were:

- Seroprevalence of various infectious bronchitis virus strains in chickens.
- Effect of foliar application of micronutrient in combination with urea on the yield and fruit quality of sweet oranges.
- Clinical evaluation and acceptability of a few therapeutic diets on human subjects.
- Studies on the aetiology and pathology of calf mortality in buffalo and cow neonates.
- Ecological studies of the vegetation of Swat district.
- Modelling the yield potential and N fertilizer requirements of wheat using soil and weather data for irrigated and dryland areas of NWFP.
- Compendium of seed-borne fungi of oil-seed crops.
- Plasmids of gram positive cocci as tools for genetic engineering.
- Petrotectonic elements & tectonic frame work of North-West Himalaya.
- Designing, development & fabrication of a continuous tray dryer
- Evaluation of trace elements and aerosols in air and their effect on urban environment of Punjab area in Pakistan.
- Production of mycelial protein from cellulosic biomass as a substrate for poultry feed.
- Calculation of potential energy surface for ion pairs derived from the alkali and alkaline earth metals reduction of some substituted ethylenes.
- The Pseudo-Newtonian formalism.
- Wave propagation and transport phenomenon in controlled fusion.
- Study of plasma focus discharge.

Scientific research was further supported by awarding annual grants-in-aid for various societies/institutions for publication of technical journals. During the year, a total amount of Rs. 0.430 million were released for the purpose. Furthermore, nine scientists were given travel grants to participate in international conferences abroad. The PSF also awarded fellowships for undertaking M.Phil and Ph.D. studies to two students.

SCIENCE POPULARIZATION:

PSF regularly gives financial assistance for holding conferences and seminars etc. During the year, 30 such activities were co-sponsored with a total amount of Rs. 0.695 million.

Pakistan Science Foundation puts great emphasis on increasing the awareness of people about scientific developments, and for the purpose, it organizes and supports organization of Science Fairs and Exhibitions from time to time. In 1994-95, the Foundation organized Science & Technology Exposition-1994 in October 1994 at the

National Library, Islamabad on the occasion of first meeting of the "Commission on Science and Technology for Sustainable Development in the South" (COMSATS). The Prime Minister of Pakistan inaugurated the Exposition. An exposition, "Khyber Carnival" was organized at PCSIR Labs, Peshawar during April, 1995. The expo was aimed at promoting awareness on science and technology in the region, and developing a relationship between the hi-tech and other industries as well as the consumers.

A computer exhibition was also arranged during December, 1994 at Al-Hamra Arts Council, Lahore. In addition, four different institutions of Punjab and Sindh were financially supported for organization of exhibitions and competitions at local level.

For public awareness particularly at schools, science films and planetarium shows were organized in 32 schools during the year. The Science Clubs Program of the Foundation continued and a number of items including 12 General Science books with 1000 copies each were purchased and distributed among the schools. Eighth set of 10 posters on science themes was also prepared, printed and distributed to more than 7000 schools and NGOs. The "Science Digest" and leaflets on various science themes were also sent to schools and the clubs.

Intra and Inter-Board Science Poster and Intra Board Essay contests were also organized during the year and the winner children were awarded cash prizes .

Science Caravan, a very important activity for popularization of science, organized their exhibitions and shows throughout the year. Three units, viz., Federal, NWFP and Sindh remained active during the year. The staff for Balochistan unit was appointed during the year and the unit became operative.

For the promotion of scholarly aptitude and attitude, two advance level books written by Pakistani scientists entitled, "Muslims: the Pioneers of Science" and "Genetic Improvement of Native Cattle through Cross Breeding and Introduction of Exotic Dairy Cattle in Pakistan" by Dr. A.R. Nowshervi and Dr. Ulfat-un-Nabi respectively were purchased and donated to universities and institutions in the country.

PAKISTAN MUSEUM OF NATURAL HISTORY (PMNH)

PMNH continued its research and educational activities during the year 1994-95 despite poor funding position. It was possible mainly through international collaborative programs. PMNH was able to add 2335 specimens of plants, animals, minerals and fossils etc. to its collection. These collections were made during 26 field trips undertaken by the three science divisions of the Museum, viz., Botanical, Zoological and Earth Sciences Divisions. This material, alongwith other material already collected, was thoroughly researched upon. Based on this research, 13 research articles were published in scientific journals of international repute including 6 in foreign journals.

Interaction between PMNH scientists and many foreign organizations also continued. The collaborative work between PMNH and Florida State Museum, on small mammals of Pakistan also continued during the year. Similarly, research collaborative program between PMNH and Oxford University and ETH Switzerland also started.

The Museum's education program also remained quite active and guided tours of the museum were provided to 3772 students and teachers. In addition, 15,590 and 79,200 people from general public visited the main display center and display corner respectively.

PAKISTAN SCIENTIFIC AND TECHNOLOGICAL INFORMATION CENTRE (PASTIC)

PASTIC is another subsidiary organization of PSF with the following objectives.

1. To collect, organize, classify and disseminate information in all disciplines of Science and Technology to the 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, 3230 requests for supply of articles were received out of which 2417 were honored, 270 bibliographies and 19,943 references were also prepared, compiled and supplied to clients.

Six issues of Pakistan Science Abstracts were published/prepared based on recent research articles in various Pakistani S&T journals.

The usual activities under CEHANET, INFOTERRA and ASTINFO Programs were undertaken which included provision of environmental information, IDAMS & CDS ISIS software packages and distribution of publications of these networks. The Director, PASTIC attended the 2nd Meeting of the Governing Board of SAARC Documentation Center, Delhi. Program Officer of UNEP INFOTERRA visited PASTIC during the report period.

The Library received 1024 books, 5421 periodical issues and 175 documents. Contents of 30 biological journals were supplied to 150 clients. Photocopies of 34 articles

were supplied to various organisations. Various databases on CD-ROM were also purchased/updated.

The Union Catalogue of 103 S&T libraries of Pakistan was published. Reprographic Unit undertook 123 printing jobs for 40 organizations which included composing, offset/laser printing and binding.

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 database in the world on trade/techology information from the developing countries. These 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 1994-95, 2050 technology/trade offers and requests came from 25 countries and were sent to 175 users in Pakistan. Pakitani enterprenuers/business organisations submitted information on 950 products/processes/technologies which were advertised abroad through TIPS network.

TIPS third book on trade and technology information in Urdu language is under process.

INTRODUCTION

Pakistan Science Foundation was established on June 30, 1973 under the Pakistan Science Foundation Act No. III (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 organizations 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 assist them in collaboration with concerned agencies to seek appropriate employment; and
- iii) establish liaison with similar bodies in other countries.

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

CHAPTER - 1

ACTIVITIES & PROGRAMS

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

- i. Establishment of comprehensive scientific & technological information & dissemination centers.
- ii. Promotion and financing of scientific research in the country, and the utilization of the research results.
- iii. Promotion and popularization of science in society.
- iv. International liaison.

The first activity is carried out through Pakistan Scientific and Technological Information Center (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 second subsidiary of PSF. The Science Wing of the Foundation is further divided into two sub sections as under:-

(A) Research Support Section performing the following activities.

1. Research Support.
 - a) Grants for Research Projects
 - b) Institutional Support
2. Research Evaluation.
3. Funding for Scientific Societies/Learned Bodies.
4. Exchange of Visits.
5. Awards and Fellowships.
6. Planning and Development Program.
7. Scientists Pool.
8. International Liaison.
9. Other Activities.

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

1. Funding for Conferences, Symposia, Seminars, Workshops.
2. Organization of Science Exhibitions/Fairs.

3. Popular Science Lectures.
4. Arranging Film, Planetarium and Slide Shows.
5. Distribution of Scientific Books and Magazines.
6. Science Clubs Programme.
7. Science Posters.
8. Inter Board Science Posters Contest.
9. Intra Board Science Essay Competition.
10. Promotion of Science in Rural Areas through Mobile Science Exhibition (Science Caravans).

The progress of the work carried out by the Science Sections of the Foundation, PASTIC and PMNH during the year 1994-95 is summarized in the following pages.

PAKISTAN SCIENCE FOUNDATION

A. RESEARCH SUPPORT SECTION

The progress of work done by the Research Support Section during 1994-95 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 the country is the main function of PSF. The research support activities are carried out through following programs.

- i. Grants for Research Projects.
- ii. Institutional Support.
- iii. Support for participation in regional and international research programs.

a) Grants for Research Projects

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

During the period under report, a total of 101 projects remained under consideration of the Foundation for funding. Among these, 37 were newly received while 64 projects were brought forward from the previous year. These proposals were examined by the subject experts in the light of their scientific merit and relevance to the national needs according to the criteria laid down by the Foundation. The criteria for research funding are: a) competence of the scientific personnel available to carry out the research, b) institutional capability, i.e., availability of requisite equipment and library facilities, c) scientific merit of the proposed research, and d) likelihood of completion of the project within the stipulated time.

Each proposal, after a critical review by the subject expert is placed before the Technical and other Committees of the Foundation for consideration. During the year, 27 project proposals succeeded in getting the approval of the Foundation at an estimated cost of Rs.5.88 million, their details are given as Annexure-II.

b) Institutional Support

Pakistan Science Foundation assists the universities and institutions in the provision of equipment, chemicals, literature etc. to research workers who, for one reason or the other, are unable to obtain these from their own institutions and it is established that such support would lead to quick progress of research of national significance. The emphasis is on: i) fostering and equipping multidisciplinary research units directed towards the solution of problems in high research priority, ii) provision of equipment, literature, staff training facilities and improvement of data processing, documentation and information systems, and similar facilities which would build up research capabilities of the selected research centers and units.

During the report period an amount of Rs. 0.545 million was sanctioned to various institutions as given below.

Institution/Department	Purpose	Amount
Chairman, Department of Zoology, University of the Punjab, Lahore	Purchase of equipment viz.: i) Laminar flow system ii) Tissue Homogenizer and Computer	Rs. 1.55,000/-
Pakistan Museum of Natural History, Islamabad	Exploration of natural history material in Tharparkar, Sindh	Rs. 50,000/-
H.E.J. Research Institute of Chemistry, University of Karachi, Karachi.	Purchase of silicon graphic system	Rs.300,000/-
Pakistan Museum of Natural History, Islamabad	Purchase of glass jars	Rs. 40,000/-

c) Task Force on Biotechnology and Genetic Engineering

The recent advances in Biotechnology and Genetic Engineering have made it possible to harness the living organisms to do more useful work for mankind than was possible through conventional technologies. Availability of these novel technologies has expanded the scope of their application in agriculture, health, industry and energy sectors.

In view of such advances taking place on the international scene, the Pakistan Science Foundation decided to setup a "Task Force on Biotechnology and Genetic Engineering" and convened a meeting of the experts in Biotechnology, Genetic Engineering and allied fields at National Institute for Biotechnology and Genetic Engineering (NIBGE), Faisalabad on 31 January, 1995 to review the existing infrastructure, identify technologically feasible and economically viable projects and propose measures to implement these projects. After deliberations upon various aspects of the issue, four sub committees viz.: Health, Agriculture, Industry, Energy and Environment were constituted and the coordinator of each subcommittee was made responsible to prioritize concept papers in his respective field and send them to the Foundation for financial assistance.

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 funded research projects. The details of these projects are as under:

a) On-Going Projects:

During the year, 24 semi-annual and 29 annual technical reports were received by the Foundation. After initial scrutiny by the Science Wing, the annual reports were sent for detailed evaluation to the subject experts. The progress reports were then submitted to the respective Technical Committees alongwith the evaluation reports from the experts concerned for consideration. The remarks of the Technical Committees, if any, were conveyed to the Principal Investigators of the projects for requisite action, and their due installments were then released.

b) Completed Projects

During the period under report, 16 studies/projects had completed and their final reports were received and subsequently sent to subject experts for evaluation. These reports alongwith their evaluation by the subject experts were submitted to the relevant Technical Committees for consideration. The list of completed projects and their summaries are given below:

- Seroprevalence of various infectious bronchitis virus strains in Chickens.
- Effect of foliar application of micronutrient in combination with urea on the yield and fruit quality of sweet oranges.
- Clinical evaluation and acceptability of a few therapeutic diets on human subjects.
- Studies on the aetiology and pathology of calf mortality in buffalo and cow neonates.
- Ecological studies of the vegetation of swat district.
- Modeling the Yield Potential and N Fertilizer Requirements of Wheat Using Soil And Weather Data for Irrigated and Dryland Areas of NWFP.
- Compendium of seed-borne fungi of oil-seed crops.
- Plasmids of gram positive cocci as tools for genetic engineering.
- Petrotectonic elements and tectonic frame work of north-west Himalaya.
- Design, development and fabrication of a continuous tray dryer
- Evaluation of trace elements and aerosols in air and their effect on urban environment of punjab area in pakistan.
- Production of mycelial protein from celcullosic biomass as a substrate for poultry feed.

- Calculation of potential energy surface for ion pairs derived from the alkali and alkaline earth metals reduction of some substituted ethylenes.
- The pseudo-newtonian formalism.
- Wave propagation and transport phenomenon in controlled fusion.
- Study of plasma focus discharge.

Summaries of the projects completed during the year 1994-95

Project No.	PSF/RES/P-VC/AGR(100)
Name of P.I.	Dr. Mohammad Akram Muneer College of Veterinary Science, Lahore.
Project Title	Seroprevalence of various infectious bronchitis virus strains in Chickens.

Summary:

A total of 2320 blood samples and 409 egg samples were analyzed for the presence of antibodies to various strains of avian infectious bronchitis virus (AIBV). For this purpose, commercial broiler, broiler breeder, commercial layer and layer breeder farms located in various geographical regions of the provinces of the Punjab and NWFP were visited, and flock histories in terms of production performances, growth patterns and IB disease prevalence, vaccinated and vaccination programs and mortality were recorded. Samples of blood from locally bred desi birds and pheasants were also collected. Attempts were made to sample only those farms which had experienced high morbidity, low production and mortality in the past growing or laying flocks housed at such farms. Samples from acute phase of illness and convalescent period were collected where-ever possible. It was observed that there was a general trend to house and rear multiple age groups at the same time, the poultry farms were located at a very close distances from each other and were either not following any proper vaccination programs or were not using any IBV Vaccines. The seroprevalence of IBV antibodies in unvaccinated flocks was more in areas where poultry farms were located in clusters or had developed into poultry estates. In case of commercial layers, layer breeder and broiler breeder birds, their mishappen and normal eggs were also collected for detection of antibodies to various strains/types of IBV. The serum and egg-yolk samples were analyzed using the hemagglutination-inhibition and ager gel precipitin tests. This study indicated the presence of antibodies to various AIBV types such as Arkansas, Massachusetts -41 (M-41), JMK, D274 and D-1466. It was further observed that the breeder and commercial flocks which did not receive any killer or live IBV vaccination had significant levels of humoral and yolk antibodies indicating that various types of IBV were circulating in the poultry flocks in various areas of the Punjab and NWFP. The flocks indicating low egg production and quality and respiratory distress and poor feed conversion rations did suffer

from the attack of some IBV strain(s) as they also had quite significant levels of humoral/yolk antibodies.

Project No. **PSF/FAU (107)**
Name of P.I. Prof. Jehangir K. Khattak
Dean, Faculty of Crop Production Sciences, NWFP Agricultural University, Peshawar
Project Title Effect of foliar application of micronutrient in combination with urea on the yield and fruit quality of sweet oranges.

Summary

The objectives of the project were: a) To determine the effect of foliar spray of micronutrients on the growth, yield and fruit quality of sweet oranges. b) To determine sufficiency/deficiency level of micronutrients (Zn, Cu, Fe, Mn and B) for sweet oranges using established criteria. c) to formulate recommendation of foliar application of micronutrient to sweet oranges on the basis of three years field data (five field experiments). The critical levels of Zn, Mn and B in citrus leaves (Blood Red Variety) were modified and found to be 40, 28 and 40 mgkh respectively. these critical values will be of great help and will determine the sufficiency/deficiency levels in citrus leaves.

From the studies it was concluded that Zn (0.44%), Mn (0.19%), B(0.05%) and Cu (0.07%) on formula basis in the presence of urea (0.85%) and wetting agent (surf) 0.1%, gave effective curing of deficiency symptoms on citrus leaves, gave more yield and improved fruit quality parameters by adopting the technology developed during this project. The socio-economic condition of the citrus growers could be greatly improved.

For the benefit of the farmers three extension bulletins, 2000 each were published by the out Reach Directorate, NWFP Agricultural University, Peshawar. From this project 4 research papers were submitted to various national research journals, out of which two were published by Sarhad Journal of Agriculture. One paper was presented in international seminar held at Faisalabad. In addition to the above, 10 M.Sc. (Hons) students have completed their thesis as a part of this project.

Project No. **PSF F-AU/AGR/114/1**
Name of P.I. Prof. Dr. Tajammal Hussain
Faculty of Nutrition Sciences,
NWFP Agricultural University, Peshawar.
Project Title. Clinical evaluation and acceptability of a few therapeutic diets on human subjects.

Summary

A research study was undertaken to clinically evaluate the impact of three therapeutic diet for diabetes, hypertension and coronary heart disease as formulated in normal and therapeutic diet manual for Pakistani population on patients suffering from these diseases.

The results of a short term clinical study showed that the diabetic diet tested resulted in significant reduction of blood glucose level to an acceptable limit in NIDDM patients. A caloric restricted diet for weight reduction, combined with low salt intake showed a significant decrease in both systolic and diastolic blood pressure in hypertensive patients. By reducing the intake of total fat, saturated fatty acid, salt and cholesterol in diet and with the use of more vegetables and fruits, resulted in reducing the blood cholesterol level in coronary heart disease patients.

Though the results were significant but these cannot be applied to the entire population, because of small size, short duration and not taking into account other risk factors. Further long term clinical trials on a large sample population are needed to establish a definite relationship between therapeutic diets and metabolic disorders.

Project No. **PSF P-AU/AGR(118)**

Name of P.I. Professor Dr. M. Zaman Khan
Chairman, Department of Veterinary Pathology,
University of Agriculture Faisalabad.

Project Title. Studies on the aetiology and pathology of calf mortality in buffalo
and cow neonates.

Summary

This study was conducted on 325 neonates of Nili-Ravi buffaloes and 354 of Sahiwal cows maintained at the Livestock Production Research Institute, Bahadurnagar during 1990-92. The overall incidence of mortality among buffalo and cow neonates was 7.08% and 11.02% respectively. The mortality was not influenced by sex and birth weight but age of neonates, parity of dams and season of the year had a significant effect. The mortality was significantly higher during 3rd week, and among neonates of 2nd parity dams.

Diarrhoea in neonates of both the species caused higher morbidity, mortality and fatality than pneumonia and pneumo-enteritis. Navel-ill, umbilical hernia and mange caused only morbidity whereas heat stroke proved fatal in one cow neonate.

Hematological values with regard to sex of neonates and parity of the dams showed nonsignificant difference in both the species. The number of RBCs was significantly less whereas Hb concentration, PCV, MCV, CCHC and TLC were significantly higher at birth in healthy neonates. Significantly low ESR at birth in buffaloes neonates was recorded whereas in cow neonates it showed non-significant variations. Roulcaux formation was observed in buffalo neonates. Neutrophils showed significantly higher counts at birth than lymphocytes and from 2nd week onward, lymphocytes, were more in number than neutrophils and this trend continued upto 4th week of age in neonates of both the species.

Enteropathogenic *E. coli* and *Salmonella* sp. were isolated from faecal samples of diarrhoeic neonates. The incidence of the former was significantly higher in 1st week and of the later in 3rd week of age. Bacterial organisms isolated from nasal discharges of pneumonic neonates showed high incidence of *Pasteurella haemolytica* followed by *Actinomyces pyogenes*, *Staphylococci streptococci* and *P. multocida*.

Diarrhoeic lesions in neonates of both the species were nearly the same whether caused by enteropathogenic *E. coli*, *Salmonella* sp. or with no established aetiology. The carcasses showed moderate to severe emaciation and dehydration. Milk curds in aboasum and mucosal haemorrhages were recorded. Lesions in the duodenum were minimal and less severe than those in the jejunum and ileum which showed focal to diffuse nyuperamia and petechial or linear haemorrhages. The faeces were yellowish-watery mixed either with mucous, blood or fibrinonecrotic material. Hepatomegaly with distended gall bladder were also observed.

Project No. **PSF/RES/PMNH/BIO (148)**

Name of P.I. Dr.M.Rashid Awan
Associate Curator,
Pakistan Museum of Natural History, Islamabad.

Project Title. Ecological studies of the vegetation of Swat district.

Summary

Swat ,originally Udyana (garden) is a land which shines like the sun. It is a lush green district of NWFP with an area of about 8,788 sq.km.: ranges from 991 meters to 5918 meters elevation above sea level, lies between 34,09, and 35.56, north latitude and 7207 to 7300 east longitude. It is bounded in the north by Gilgit and Chitral districts, in the south by Mardan district, in the east by Kohistan and Mansehra districts while in the west by Malakand Agency and Dir district.

Ecological studies on the vegetation of Swat district were undertaken during 1989-93 to achieve the following objectives: To identify plant communities and their analytical and synthetic characteristics, to correlate different plant communities with soil and climatic conditions of the region, to study the impact of grazing and erosion on vegetation and identify the vegetation. Samples were collected in plains by using Quadrante Method (10x10m for trees and 2x2 m for herbs and shrubs) while in slopes by Line Transect Method. Three soil samples were collected from herbs and shrubs localities, at 24 cms. depth while from coniferous/broad leaved X forest at 36-48 cms depth. On the basis of data analysis, the 21 variable plant communities were established after importance value of their leading dominants. The study shows 21 habitats in Swat district which are important from different practical aspects such as land capability classification of the area. Mining for small extensive marble industries and emerald mine are serious threat not only to the original vegetation of the area but also to the whole wild life. Swat flora is primarily Himalayan and secondarily Russian Asian with of course some cosmopolitan elements . It was observed that *Pinus walichiana* (blue pine) were suffering from mistletoes (*Arceumobium minutissimum*) especially in upper Swat area.

Project No. **PSF/F-Au/Agr(120)**

Name of P.I Dr. Aman Ullah Bhatti
Department of Soil Science,
NWFP Agricultural University, Peshawar.

Project Title: Modeling the Yield Potential and N Fertilizer Requirements of
Wheat Using Soil and Weather Data for Irrigated and Dryland
Areas of NWFP.

Summary:

Traditionally, fertilizer recommendations are based on crop response to fertilizers in field experiments. To save time and fertilizer resources, there is a need to develop predictive models for N fertilizer requirements for different areas. Thus models developed can be validated in the field.

The main objective of the present study was to develop predictive models to estimate potential wheat yield and determine appropriate rate of N fertilizer for making site specific recommendations based on the soil properties. Different regression models were developed during the years 1992-93 and 1993-94 to predict wheat yield and determine N requirements of wheat. These regression models were used to predict wheat yields and N fertilizer requirements of selected sites in D.I. Khan, Mardan and Swat districts. One irrigated and one barani site was selected in each district. Soil samples collected from these sites were analyzed for properties to be used in the models:

Six field trials on these selected sites were conducted to compare the N rates determined from models with the recommended rate of N for those areas. Design employed for these studies was randomized complete bloc with three replications. Basal dose of 90kg P₂O₅ and 60 kg K₂O /ha was used for irrigated trials, while 50 kg P₂O₂ for barani trials of D. I. Khan and Mardan, and 45 kg P₂O₅ and 30 kg K₂O/ha for Swat.

All recommended cultural practices were followed by the farmers during the growing season. Crop was planted in October/November, 1994 and harvested in April/May, 1995. Grain yields were measured from all the trials for all the treatments. Yields collected from each trial were subjected to statistical analysis for making comparisons among fertilizer treatments.

The results obtained showed significant differences among fertilizer treatments almost in all the trials. In case of irrigated trials, combined model proved better than other models for D.I. Khan and Swat sites while 1992-93 model for Mardan. In case of barani trials, combined model proved better than the recommended rate of N for all the three sites. It is obvious from these results that the different models were effective in predicting wheat yields and estimating site specific N requirements for different sites under irrigated as well as barani conditions. These models can be successfully used to estimate wheat yields and N fertilizer requirements using soil properties, which will save time. Moreover, it will avoid over or under fertilization of wheat, and have some environmental impact as well.

Project No. **PSF/S-KU/AGR(125)**
Name of P.I. Prof. Dr. M.H. Hashmi
 Department of Botany, University of Karachi, Karachi.
Project Title. Compendium of seed-borne fungi of oil-seed crops.

Summary:

Many forms of fungi, bacteria, viruses and insects are known to be seed-borne or seed-carried. Of these, the fungi are a major cause of spoilage in stored grains and seeds and probably ran second only to insects as a cause of deterioration and loss in all kinds of seeds throughout the world. There is now hardly any cultivated crop where at least one seed-borne fungal parasite is not known. The present compendium is another step

towards this approach, which provides a basic diagnostic tool for the identification of seed-borne fungi of three important oil-seed crops viz.: linseed, mustard, and sunflower. This compendium represents a systematic arrangement, specification and condensation of mycological data into a coherent body of information. The present manuscript deals with 19 genera and 35 species of fungi growing on oil crops isolated from seed samples of linseed, mustard and sunflower by standard blotter method as well as deep freezing method. Whereas, fungi, *Aspergillus ochraceus simplex* and *Syncephalastrum racemosum* are newly recorded species on mustard and sunflower seeds. *Cladosporium cladosporioides* *Eurotium* sp. *Memmoniella echinate* were found for the first time on sunflower and linseed whereas, *Fusarium moniliforme* and *stachybotrys atra* has been isolated from mustard and linseed. Likewise, *Gonatobotrys simplex* *Myrothecium verrucaria* and *Verticillium* sp. were newly recorded species from sunflower seeds. *Cephalosporium acremonium*, *cheatomium bostrychodes*, *Curvularia pallescens*, *Fusarium proliferatum* and *F. chlamydosporum* from linseed are new record. On mustard seeds 10 fungal species were found predominant in standard blotter method. The occurrence of predominant fungi have been reduced to 5 species in deep freezing method. In *Helianthus annuus* seeds 9 fungal species were found predominant in standard blotter method.

As compared to blotter methods, slow growing fungi increased their infection percentage in deep freezing method. Standard blotter method supports the occurrence of fast growing fungi which are mostly shortage fungi. In deep freezing method mostly slow growing fungi were observed which may be due to case of observation and partly due to fact that dead embryo provided nourishment to the developing mycoflora. In present work *Verticillium* sp. has been isolated from sunflower in both incubation methods. Oil seed crop plants have significant place in the economy of country and earn huge foreign exchange. This oil is used for edible purposes and for blends (paints and varnishes) and the plants are used as fodder and forage.

Project No.	PSF/Res/S-Ku/Bio(170)
Name of P.I	Sheikh Ajaz Rasool Department of Microbiology, University of Karachi, Karachi.
Project Title:	Plasmids of Gram Positive Cocci as Tools for Genetic Engineering.

Summary

More than 250 Gram positive (cocci) indigenous clinical isolates were identified on the basis of morphological, growth (cultural/colonial), biochemical and metabolite production characteristics. Among them 205 belonged to genus *staphylococcus*; 30 to genus *streptococcus* and 15 to genus *micrococcus*. Studies have not only been undertaken to search for the prevalence of antibiotic resistance behavior among indigenous clinical staphylococci, but successful intergeneric transfer of gentamicin resistant markers of five isolates has even been reported by filter paper matings from *Staphylococcus aureus* to *Klebsiella pneumoniae*. Follow up studies were focused on staphylococcal isolates. 100% of the isolates have offered resistance via one or the other mode of action (viz. by inhibiting protein synthesis, nucleic acid replication or cell wall synthesis). Present findings clearly indicate towards the increasing (absolute) trend of drug resistance (against one or the other antibiotic). The antibiotic used for screening included ampicillin, cephradine, erythromycin, gentamicin, neomycin, polymixin-B, streptomycin and

tetracycline. Resistance to polymixin-B has been found to be the most common (78%); however, tetracycline resistance has been found to be the least (9%). A few bacteriocin producing (7%) strains of staphylococci have also been isolated. However, these bacteriocins were only effective against closely related strains. It is interesting that almost all the bacteriocinogenic strains lost this property after curing; thereby indicating the bacteriocin regulation by plasmid-borne genes in Gram positive cocci in general.

The acridine orange and elevated temperature mediated plasmid curing experiment showed that in 20 cultures one or more antibiotic resistance marker was found to be present on plasmid. Thus, some resistance determinants are located on the chromosome as well. However, the bacteriocinogenic determinants were found to be present solely on plasmid as all the 17 bacteriocinogenic isolates were cured after similar plasmid eliminating procedures.

Most Plasmids (narrow-host range) exist in only a limited number of closely related bacteria. However, the less frequent plasmids are referred to as broad-host range because they can be transferred to and maintained in bacteria of distant species and genera. Such plasmids are useful for establishing the genetic systems and drawing of genetic maps for several desirable bacteria and can also be used as shuttle vectors in "Genetic Engineering". We have been able to isolate the stable broad-host range plasmids (from our isolates) that have been transferred successfully into distant recipients by in vivo gene manipulations. Most of the plasmids referred here, have been isolated and characterized on the bases of electrophoretic mobilities. The method for the isolation and identification of staphylococcal plasmids employed in our studies was developed from mini-prep protocol. This method has enabled to analyze several isolates simultaneously. The plasmids were characterized (for approximate molecular weight estimation) by horizontal agarose gel electrophoresis using *ecoR* I, *Hind* III lambda digest as ladder. It is interesting that natural broad-host range staphylococcal plasmids have been reported for the first time in Pakistan. We may speculate that Gram +ve plasmids (with particular reference to *Staph. Aureus*) carry a still broader host-range trend of transmissibility and expression potential and thus, may prove to be the better shuttle vectors for genetic engineering technologies.

Project No: **P-PU/Earth (37)**

Name of P.I. Dr. Muhammad Nawaz Chaudhry
Institute of Geology, Punjab University, Lahore.

Project Title: Petrotectonic Elements and Tectonic Frame Work of North-West Himalaya.

Summary

Under the project geological mapping of nearly 5000 km terrain at 1:50,000 and larger upto 1:9500 mainly of the Higher and Lesser Himalaya and southeast Kohistan has been undertaken. Based on this mapping, the Precambrian stratigraphy of a vast metasedimentary terrain has been worked out for the first time. Detailed lithostratigraphy of Kohistan has also been worked out in its south eastern region. Large and messoscale structures of Kohistan, Kaghan and parts of South Hazara have been described and discussed. Significant conclusion can be listed as follows:

1. The position of MCT demarcation and differentiating the Higher Himalaya Crystalline from the Lesser Himalaya can now be delineated throughout Northwest Himalaya. This completes the subdivision of Northwest Himalaya in Pakistan and its correlation with Kashmir and Kumann Himalaya.
2. The all inclusive Salkhala Formation is a misnomer and has helped confuse the stratigraphy and tectonics of Higher and Lesser Himalayas. It should be dropped in favour of the new stratigraphic subdivisions suggested in the text.
3. The Tanols of Mansehra represented a stratigraphically different horizons from rock of the same name in Kashmir.
4. Contrary to the common belief the Tanol Formation of Hazara is older than Hazara slates.
5. Contrary to the common belief the Oghi Shear is not the MCT and the Maically Mansehra Batgram is a part of the Lesser Himalayan terrain.
6. The Agglomeratic Slate of Kaghan Valley represent a cratonic rifts assemblage.
7. The Panjal volcanics of Kaghan have oceanic affinities and indicate of Hercynide event on the northern margin of Indian plate in northwest Himalaya.
8. Tectonically and stratigraphically the Peshawar Basin is an analogue of Kashmir Basin; the Koga-Loe Shilman Alkaline Province being a continental province complimentary to the Panjal volcanics of Kashmir and Kaghan.
9. Three stratigraphic provinces of Hazara, Muzaffarabad and Kashmir are tectonically juxtaposed in the Balakot-Muzaffarabad region on Kashmir-Hazara boundary.
10. The high grade terrain of Lower Swat (north of Malakand and Pacha), Besham, Upper Kaghan and Upper Neelum represent the Higher Himalaya Crystalline in Pakistan. This belt continues north into the high grade terrain of Nanga Parbat-Haramesh Massif. The HHC belt pinches out for sometime east of the Thakot Fault (Oghi Shear) in Northern Hazara.
11. The Low grade pelites, calc-pelites and graphitic phyllites of the Bachh, Banna and Karora sequences of Upper Kaghan, Northern Hazara and Lower Swat represent the Tibetan-Tethys Himalaya in Pakistan.
12. Next in importance of MCT is the discovery of eclogites in the vicinity of Gittidasand Besal areas of Upper Kaghan. These provide PT constraints of 650 C at 13 Kbars corresponding to a depth of 45 to 60 km.

13. The Lesser Himalaya of Kaghan Valley occur in the apical zone of Hazara-Kashmir Syntaxis and form a typical schuppen zone as also in the Mansehra-Batgram area of Northern Hazara. Farther to the east Kashmir Basin and to the west, the Peshawar Basin have transmitted stresses over decollement with more intense deformation shifting to the southern margin. A similar relationship occurs between the less intensely deformed Potwar Plateau and the more intensely deformed Salt Range to its south in the Sub-Himalaya.
14. A four-phase deformation is recorded in the northeastern part of the Attock-Hazara Fold and Thrust Belt with the first phase, a Precambrian event and the last, a Plio-Pleistocene event forming NNW-SSE aligned cross-folds superimposed upon NE-SW trending earlier folds in South Hazara.
15. Contrary to the earlier idea of two major synclines no evidence was recorded for the same in Southeast Kohistan. The area instead comprises a schuppen zone with a series of north and northwest dipping high angle thrusts.
16. The structure of Nanga Parbat syntaxis is analogous to that of HKS representing indentation features and an east over west movement. The effects include superimposed cross folding to the west as well as a steepening or overturning of the plainer structures on the west.
17. More evidence has been brought forth to show that contrary to the general belief in Himalaya metamorphism one or more strong Precambrian events had preceded, followed by a weak Permian Hercynide event.

On the basis of the work conducted under this project 30 research papers were published in National and International Journals and were presented in International Conferences. Besides this one Ph.D. degree has also been awarded under this project.

Project No: **P-CSIR/Eng(23)**

Name of P.I. Dr. A.B. Chaudhry
General Services Division,
PCSIR Laboratories Complex, Lahore.

Project Title: Design, Development & Fabrication of a Continuous Tray Dryer

Summary

The drying of a material is the last unit operation in a manufacturing process and is carried out immediately prior to packaging or despatch. Drying is unusually referred to as the final removal of water and the operation often follows evaporation, filtration or crystallization. It is also one of the most complex and least understood operations because of the difficulties and deficiencies in mathematical descriptions of the phenomena of

simultaneous transport of heat, mass and momentum in solid media. Drying is therefore an amalgam of science, technology and art (or know-how based on extensive experimental observations and operating experiences).

Under this project, a continuous tray dryer along with hot air system was designed and fabricated in the G.S. Div. of PCSIR Labs. Complex, Lahore. The same was installed, commissioned and successfully operated in R.I.Div. The unit was subjected to one month operation during which its performance was satisfactory.

Various materials can be dried on the unit but wheat was selected for conducting operational test. The drying parameters such as Temperature, Moisture, Air Distribution, Residence Time were studied. The drying rate curves were drawn which established the suitability of CTD unit for drying purpose.

Project No: **S-SU/Chem (184)**

Name & Address Dr. Muhammad Umar Dahot,
of P.I. Assistant Professor, Institute of Chemistry,
University of Sindh, Jamshoro.

Project Title: Production of Mycelial Protein from Cellulosic Biomass as
a Substrate for Poultry Feed.

Summary

The present study was undertaken to explore the possible use of agricultural waste which is produced more than 50 million tones in this country. In the initial stage rice husk was hydrolyzed into fermentable sugars using acid, alkali and cellulose pretreatment method. The fermentable sugars produced by different treatment methods were used as a substrate for the growth of micro-organisms such as *Penicillium expansum* and *Penicillium javanicum* and in the production of fungal mycelial protein biomass.

From this study, it is observed that acid pre-treatment (H_2SO_4 BHC) is content in fungal mycelial biomass than other pretreated methods (physical/alkali and enzymatic). *P.expansum* produces more mycelial biomass than *P.javanicum* on 0.6N H_2SO_4 pretreated rice husk. It was also noted that initial pH 4.0 + 0.2 has a profound effect on the production of mycelial biomass but alkaline pH has retorted the production of mycelial biomass by *Penicillium expansum*.

It was also observed that the growth rate of chicks was increased upto 27.59% when 10% mycelial protein biomass of *P. expansum* was incorporated in the normal basal diet. The nucleic acid was detected in very low concentration but aflatoxin were found absent in the mycelial biomass produced by *P. expansum*. No significant harmful effect were detected during the analysis of liver and myocardium histopathology, blood

chemistry. serum protein electrophoresis and serum enzymes in the chicks feed on normal diet and normal diet supplemented with mycelial protein biomass of *P. expansum*.

Project No. **P-PU/Chem (208)**

Name & Address Prof. Dr. Muhammad Zafar Iqbal
Director, Institute of Chemistry,
University of the Punjab, Lahore.

Project Title: Evaluation of Trace Elements and Aerosoles in Air and Their
Effect on Urban Environment of Punjab Area in Pakistan.

Summary

Several natural anthropogenic sources introduce a number of inorganic elements in the atmosphere, which may be transported to long distance. The understanding and prediction of these trace elements requires knowledge of its component. The present project envisaged at studying: (i) elemental composition of air particulates to assess the quality of atmosphere (ii) evaluation of trace elements, toxic gases and aerosols in the atmosphere of urban, industrial and rural areas of Punjab (iii) correlation between air pollution levels and toxicity in animals, plants and human in polluted atmosphere.

Under the present investigation an attempt was made to carry out sampling of the aerosol particulate in the atmosphere of Punjab. The total suspended particulate matter and their size distribution in Punjab area were also studied by applying different techniques. These elemental composition of the aerosol particulates in the atmosphere of Punjab and from mild steel welding electrodes was carried out by sing neutron activation analysis (NAA) inductively coupled plasma atomic emission spectrometry (ICP-AES) and atomic adsorption spectrophotometric (AAS) techniques. The levels of SO₂, NO₂, CO and NH₃ in the atmosphere of the cities were also measured by making use of the Drager air sampling tubes. Interesting information was obtained with regard to the total suspended particulate matter (TSP) and size distribution of the aerosol particulates in the atmosphere of the Punjab areas.

It was observed that the amount of TSP in the atmosphere of the Punjab on working days was more than the maximum permissible limits set by US-EPA. Relatively high amount of TSP was observed in the atmosphere of Islamabad during non rainy days in the vicinity of the industrial area, however, this amount deceased tremendously after rain fall which is frequent in this region and counter balances the atmospheric system.

The amounts of toxic gases in the atmosphere of urban and industrial areas i.e. SO₂, CO, NH₃ and NO₂ were within the permissible limits. The toxic gases were found to be relatively more in industrial area of Sheikhpura.

Project No: **C-QU/Chem (193)**
Name & Address of P.I.: Dr. Mehboob Mohammad
Professor, Department of Chemistry,
Quaid-i-Azam University, Islamabad.

Project Title: Calculation of Potential Energy Surface for Ion Pairs derived from the Alkali and Alkaline Earth Metals Reduction of some Substituted Ethylenes.

Summary

To understand the process of an ion polymerization, it is necessary to acquire knowledge about the structure of ion pairs. This can be done through constructing potential energy surfaces. The present work was undertaken to study the polymerization and electron transfer process and studies on substituted Ethylenes needed for some additional research both on the theoretical/computational and experimental aspects were also carried out.

As a result of these investigations software was developed for constructing potential energy surfaces for the conversion of ortho to Para hydrogen. Two modules in basic languages were developed for plotting, isoenergetic counters and three dimensional perspectives. Three other modules were also developed for plotting isoenergetic topographs using peacock model.

These programs besides plotting isoenergetic contours, also gain minimum energy and the coordinates of the minimum. Further modification in the above software was carried out for three dimensional scanning, provision to calculate coordinates and calculations for non-planar molecules was also made, and potential energy calculations were carried out using the simple peacock's model as well as the more sophisticated VSS method. The software developed for plotting the potential energy surfaces from peacock's formulation was used to obtain potential energy surfaces for ortho, meta and para dicyanobenzene. This was done to study the applicability of this method to heteroaromatics.

This work was concerned with the theoretical aspect of the structure determination of ion pairs of substituted ethylenes. The structure of ion pairs as regards the position of cations was predicted and this information is useful for studying polymerization reactions. The results for neutral molecules are helpful in ascertaining the path of electrophiles in electrophilic substitution.

Project No: **C-QU/Math(16)**
Name & Address of P.I.: Prof. Dr. Asghar Qadir
Department of Mathematics,
Quaid-i-Azam University, Islamabad.

Project Title: The Pseudo-Newtonain Formalism.

Summary

Under this project the following six aspects of the problem, which are interconnected, were investigated:

(i) The extension of the UN-Formalism (ii) The reduction of space-time symmetries (iii) The Pulsar Drift (iv) The Solar System (v) The quantization in curved space-time backgrounds (vi) The Gravitational sources in the evolving universe. Work on part i-v was completed during the 3-years project duration. Work on part (vi) however could not be completed due to some errors in the data. The study, however, was completed after the project.

On the basis of the project work 24-research papers were published in National and International journals. Three Ph.D. and three M.Phil degrees were awarded on the work related to this project.

Project No. **C-QU/Phys(69)**

Name & Address : Professor Dr. G. Murtaza
of P.I. Department of Physics
 Quaid--Azam University, Islamabad.

Project Title: Wave Propagation and Transport Phenomenon in Controlled
 Fusion.

Summary

Under this project the researchers have dealt with the following problems.

(i) The dynamics of a finite-thickness gas-puff Z- θ pinch producing a high density plasma was investigated and studied numerically. Considering the effect of Ohmic heating with adiabatic conditions and incorporating the radiation losses, fusion conditions were studied for a finite-thickness gas-puff staged Z- pinch. An important observation was made that a relatively thick puff layer will be useful to obtain parameters like density and temperature with enhanced stability in the acceleration phase of puff layer in contrast to the theoretically observations of the previous work advocating thin puff layer. The numerical results obtained predict stability and will be very helpful in future experimental work on Z-0 pinch device in plasma physics.

(ii) Regarding work on laser-induced plasma, an analytical nonlocal heat transport formula based on the reduced Fokker-Planck equation was considered. The effects of inverse-bremsstrahlung absorption as well as the electrostatic potential on heat flux for a strongly inhomogeneous plasma were investigated. It was found that while the former contributes an additive term to the heat flux enhancing its value for both steep and gentle

gradient situations. the latter effect introduces an exponential term which significantly reduces the electron thermal transport. The calculations also showed that a moderately intense laser field, the maximum heat flux for steep gradient situations corresponds to flux inhibition factor of the order of 0.17.

(iii) Experimental work on sequential focusing in a Mather-type Plasma Focus has been carried out. The results indicate that such a device can possibly be used as a cascading focus device to produce bursts of neutrons and soft x-rays.

The research work conducted under this project was published in the form of four research papers. In addition two M.Phil degrees were awarded on the project work.

Project No. **C-QU/Phys (70)**

Name & Address Dr. M. Zakauallah
of P.I. Department of Physics,
 Quaid-i-Azam University - Islamabad.

Project Title: Study of Plasma Focus Discharge

Summary:

Under this project the researchers performed a number of experiments on the dense plasma focus. Some of the significant findings/achievements of their research work are as under:

(a) The deterioration of neutron yield in a low energy plasma focus operated by a single 32 μ F, 15 kV (3.6 KJ) capacitor is observed for the first time in laboratory. When sum of the discharged energy across an insulator sleeve approaches 1.6 MJ, the neutron yield from the device starts deteriorating. The insulator sleeve, when examined, is found to have a ~3 μ m thick copper layer evaporated from the electrodes of the device. It is therefore, concluded that the degradation of neutron yield in low-energy device occurs due to Cu deposition on the sleeve surface.

(b) The behavior of the current sheath in the presence of a target placed downstream of the anode is studied. The high voltage probe signal and the sequential bursts of the neutrons suggest the possibility of the plasma focus system to be used as a cascading device for the production of sequential bursts of x-rays and neutrons.

(c) To enhance the efficiency of the plasma focus system the effects of anode length and insulator sleeve length variation on the pressure range of neutron emission have been studied. It is found that the proper choice of the two parameters broadens the pressure range for the high neutron yield and hence improves the shot-to-shot reproducibility of the system

(d) A simple, low-inductance pressurized sparkgap has been successfully designed and developed for the plasma focus operation energized by a single 32 uF, 15kV (3.6kJ) capacitor. The sparkgap is capable of handling discharge current upto 200 kA with a rise time of less than 1usec.

(e) A low inductance capacitor bank for the plasma focus operation is also designed and developed. The bank comprises three modules, each consisting of two 2uF, 40kV capacitors alongwith a field-distortion-type pressurized sparkgap. A peak current of about 250 kA has been estimated when the bank is charged at 18 kV.

3. Scientific Societies and Learned Bodies

One of the regular and important functions of PSF is the promotion of Scientific Societies, Associations and Academies engaged in spreading the cause of scientific knowledge in general and/or in the pursuit of a specific scientific discipline or technology in particular.

The Foundation gives annual grants to the established scientific societies and learned bodies as partial assistance for achievement of their approved objectives and publication of their technical journals and newsletters. During 1994-95, an amount of Rs. 0.430 million was released to 11 Societies/Associations and seven (7) Journals. The list of grantees is given in Annexure III.

4. Awards and Fellowships

Awards, prizes and fellowships are granted by PSF to individuals engaged in developing processes, products and inventions of economical importance, in order to provide incentive for valuable scientific research. In addition to the Research Associates appointed @ Rs. 3,000/- per month in the projects, a fellowship amounting to Rs.24,000/- was given to an M. Phil student at Gomal University whereas Rs.10,000/- was given to a Ph.D. scholar as partial financial assistance for compilation of Ph.D. thesis.

5. Travel Grants

A major weakness of Pakistani science is its isolation. Due to lack of contact with the scientists in advance countries and the absence of intellectual interaction, many of our scientific workers become obsolescent and lose enthusiasm, freshness and spontaneity. There is an urgent need to end the isolation from the world of science of Pakistani science and scientists. Our scientific workers should be able to meet their counterparts in the advanced societies and visit international and regional research centers and universities of repute. The Foundation realizing the fact, awards travel grants for the purpose. During 1994-95, grants amounting to Rs. 293,500/- were given to the following nine scientists attending international conferences/symposia and for meeting their counterparts in institutions of higher learning in advanced countries.

S.N	Name & Address of the Scientist	Conference Attended	Amount Released
1.	Prof. Dr. M. Nawaz, Physiology & Pharmacology Deptt., University of Agriculture, Faisalabad	12th International Congress of Pharmacology held at Montreal, Canada from 24th-29th July, 1994	40,905/-
2.	Major Dr. Akhtar Nawaz Malik, Associate Professor, E.M.E. College, Rawalpindi.	2nd Biennial European Congress on Engg. System. Design & Analysis at London, July, 1994	28,280/-
3.	Dr. Akhlaq Ahmed, Deptt. of Metallurgical Engg., University of Engineering & Technology, Lahore	13th International Workshop on Rare Earth Magnets & their Application 11-15 September 1994 U.K.	28,280/-
4.	Dr. Sher Hassan Plant Pathology Deptt., NWFP Agricultural University, Peshawar.	9th Conference of the Mediterranean Phyto Pathological Union at Kusadasi, Turkey from 18th-24th Sept 94.	29,075/-
5.	Dr. R.H.Baqri, Director, Earth Sciences Division, PMNH, Islamabad.	International Symposium on Death Valley, Nevada, USA 15-17 Oct. 1994	49,226/-
6.	Dr. Bakhshal Khan Lashari Associate Professor, Irrigation & Drainage Engineering Institute, Mehran University of Engg. & Tech., Jamshoro, Sindh	2nd International Congress held from 24-26 April 1995 at Poland	27,155/-
7.*	Proff. Dr. Afzal Ahmed, NED Engg. University, Karachi.	5th Asian Congress of Fluid Mechanics held at Seoul Korea, from 10-14 Aug. 1992	26,090/-
8.*	Mr. Zahid Shah Taimur, Food Laboratory, K.M.C. 431/18 F-B Area, Karachi.	5th International Symposium on Quality Assurance at Washington D.C 22 July 1993	36,910/-
9.*	Dr. M. Aslam Rajput, Associate Professor, Botany Deptt., University of Sindh, Jamshoro	17th International Conference at Birmingham U.K, 15-21 Aug. 1993	27,630/-

* The grants were sanctioned in respective years but were released during 1994-95 for want of various documents.

6. International Liaison

Liaison with international agencies and scientific establishments in different countries serves as a means to understand each other's difficulties in scientific research and development by sharing knowledge, exchange of expertise, collaborative research etc. PSF therefore tries to keep in touch with such agencies and liaise between local and foreign scientists and agencies/institutions. To explore the possibilities of scientific collaboration of mutual interest, representatives of several foreign organizations paid visits to the Foundation.

a) MOU with Royal Society of London

PSF has an MOU signed with the Royal Society of London, UK, under which, scientists of the two countries can exchange visits. During the year under report, a Pakistani scientist visited UK and a British professor visited Pakistan.

b) S&T Protocol between the Governments of Pakistan and China

Under the above protocol, a five member delegation from China visited Pakistan from 16th October to 1st November, 1994. Accompanied by six Pakistani scientists, the team conducted ecological survey of Salt Range, Azad Kashmir and Northern Areas.

7. Planning and Development Programme of PSF

a. Development Projects:

In the PSDP 1994-95 an allocation of Rs. 11.715 million was received for the following three on-going projects of PSF, PMNH and PASTIC, which was fully utilized:

- Construction of Pakistan Science Foundation Building.
- Establishment of Pakistan Museum of Natural History at Islamabad Phase-II.
- Strengthening of PASTIC National Science Reference Library.

The progress of work done under these projects was regularly monitored and the report on physical achievements as well as utilization status of funds was provided to the Ministry of Science and Technology on quarterly basis.

b. Construction of PSF Building:

The construction of PSF building at Science Complex, Islamabad, which was initiated in February 1993, continued throughout 1994-95. Originally, an allocation of Rs. 5.524 million was made in the PSDP, which was extremely inadequate. Later on an amount of Rs. 3.474 million was re-appropriated from the savings of other organizations of the Ministry of Science and Technology towards the completion of this project. Thus an amount of Rs. 8.998 million was received during the year for the project which was fully utilized.

The building was scheduled to be completed by February, 1995. However, due to disturbances in Karachi, the supply of Alcop Windows and doors as well as Aglo-marble was severely effected and only 50% of windows were received by March 1995. This caused considerable delay in the finishing of work, installation of electric appliances, polishing etc. Consequently the shifting of PSF office to the new premises could not take place upto 30th June, 1995, as earlier envisaged.

c. The progress of PMNH & PASTIC Development projects is given in their reports respectively.

B. SCIENCE POPULARIZATION SECTION

The activities of Pakistan Science Foundation for popularization through various programs continued during 1994-95. A detail of the programs is given below.

1. Funding For Science Conferences/Seminars/Symposia/Workshop etc.

The Foundation provided financial assistance for organizing national and international conferences, seminars and symposia etc. in Pakistan. An amount of Rs. 0.695 million was provided for the purpose to various scientific societies, universities and other institutions as partial financial assistance during the year. the details are given in Annexure-III.

2. Science Fairs and Exhibitions

PSF provides funds to Boards of Intermediate and Secondary Education and other institutions for organization of science fairs and exhibitions.

a) Financial Support for Organizing Exhibitions

During the period under report, an amount of Rs. 0.093 was provided to the following institutions for the purpose.

<u>NAME OF EVENT</u>	<u>NAME OF ORGANIZATION</u>	<u>AMOUNT</u>
Science Day-94 Holding of Science Models Competition, Science Quiz & Essay Competition.	National Museum of Science & Technology, Lahore.	Rs.20,000/-
National Science Fair	B.I.S.E., Faisalabad	Rs.28,200/-
Platinum Jubilee Celebrations Science Fair	Government College Hyderabad.	Rs.15,000/-
3rd All Pakistan Professor Shaikh Intervarsity Software Competition and Exhibition.	Institute of Mathematics and Computer Science, University of Sindh, Jamshoro.	Rs.20,000/-
Khyber Carnival, Peshawar	PASTIC National Center, Islamabad.	Rs.10,000/-

b) Science Technology Expo-1994

Pakistan Science Foundation organized a Science and Technology Exposition-1994 from 4th to 9th October, 1994 at National Reference Library on the occasion of first meeting of the "Commission on Science and Technology for Sustainable Development in

the South" (COMSATS). The exposition was aimed at exposing the technological development of local S&T organizations and R&D institutes in various areas of specialization.

The Prime Minister of Pakistan inaugurated the Expo-94. After inaugurating the COMSATS meeting, the Prime Minister went round the Expo and visited various stalls where technologies from indigenous to highly sophisticated were on display. The Expo provided an excellent opportunity for display of indigenous technologies and highlighted the achievement. It also provided a forum to local organizations to interact with the delegates from different developing and developed countries. A total of 19 organizations participated in the Expo.

c) Computer Exhibition

A computer exhibition was organized by the Foundation in collaboration with PASTIC & TIPS at Al-Hamra Arts Council, Lahore, w.e.f. 29-31 December, 1994. The objective of the exhibition was to increase awareness among the general public about the use of information technology. The exhibition was inaugurated by Dr. Bashir Ahmed Shiekh, Chairman, Pakistan Science Foundation, while Dr. S.M. Qureshi, Secretary Ministry of Science and Technology was the Chief Guest and distributed the shields and certificates among the participants. Some 28 organizations participated in the exhibition. A large number of people from all walks of life witnessed the exhibition.

d) Khyber Carnival, Peshawar

PSF in collaboration with PASTIC organized an exposition "Khyber Carnival" at PCSIR Lab., Peshawar, from April 26 to 29, 1995. Dr. Bashir Ahmed Sheikh, Chairman, Pakistan Science Foundation, inaugurated the exposition. The exposition was aimed at promoting awareness on Science and Technology in the region, besides developing a rapport between hi-tech and other industries as well as with the consumer. The participation in the exposition was heterogenous in nature. PIA's Precision Engineering Complex, Karachi, displayed aircraft components and other hi-tech products, whereas Philips Electrical Company put up energy saving devices complemented by the Solar Products made by BP Solar PLC, England, displayed by Trillium Pakistan (PVT) Ltd., Rawalpindi.

Digital Radio paging and instaphone promoted state of the art communication devices, whereas, Personal Computing Solutions, Peshawar, and Inam Alvi Computers, Islamabad, were conspicuous with computers and paraphernalia. Sabro Airconditioners, Islamabad, and Kukus Complex, Valves, Lahore exhibited their products which marks the capability of engineering industry of Pakistan. Shahjehan Shoes (Charsada), Foot Craft (Gadoon Amazai), Afghan Metal Works (Peshawar) and Unique Wood Working (Rawalpindi) exhibited their works. Food Products were exhibited by Mitchel's Fruit Farms, Renala, and Sahiwal Foods, Peshawar. Medical facilities were provided by the Pakistan Heart Foundation, Peshawar.

PSF's Science Caravan Unit was one of the most attractive features of the exposition. A large number of school and college students visited the Science Caravan stalls. Pakistan Council for Research in Water Resources (PCRWR) and Pakistan Council for Scientific and Industrial Research (PCSIR) also made their presence felt with quite attractive exhibits.

Women in Development (WID), a section of the Pak Holland Metal Project, needs a special reference because their stall exhibited the beautiful metal works done by women. The objectives of WID are to assist and encourage women entrepreneurs to produce metal based products and subsequently market them. The chief guest highly appreciated their efforts and emphasized its projection.

A few other events were arranged during the exposition such as a seminar on Electronic Mail and distribution of PSF Awards on quality control, performance excellence and product designing. A large number of visitors participated the exposition, which included school and college students, researchers, government officials and general public.

3. Science Films/Planetarium Shows

Science film and planetarium shows are regularly organized by the Foundation. During the year, 768 film shows and 480 planetarium shows were arranged in 32 educational institutions of Rawalpindi/Islamabad and surroundings.

4. Science Posters Project

The 8th set of science posters comprising of the following 10 posters were distributed to more than 7000 High Schools in the country and R&D institutions.

- جنگلات کی تباہی
- شمسی توانائی
- چٹانیں
- سیم و تصور
- نقل و حرکت
- وہیل
- شہد کی مکھی
- کیونٹاج
- Portrait of Muslim Scientist Ibn Khaldun.
- Portrait of Muslim Scientist Ibn al-Nafis.

The 9th Science Posters Set-1995 comprising of 10 posters on the following themes have been prepared and sent for printing to the Printing Corporation of Pakistan:

- ایٹم برائے امن
- ریگستان
- تیشی
- دل کا دورہ
- موسمیاتی مرکز
- موصلاتی سیارے
- براعظم انٹارکٹیکا
- فاسل فیول
- Portrait of Muslim Scientist - Abul-Abbas Ahmed al-Farghani.
- Portrait of Muslim Scientist - Abu Marwan Ibn Zuhr.

5. Science Posters Contest

The 8th Inter Board Science Posters Contest was announced by the Foundation in January, 1995, the theme was "Atom for Peace". In all, eight Boards of Intermediate and Secondary Education of the country, viz. Karachi, Hyderabad, Sukkur, Multan, Lahore, Faisalabad, Sargodha, Mirpur AJ&K and Quetta participated. Three prize winning posters from each board were received and an amount of Rs. 16,000/- was then released to the winning students on account of 1st (Rs.1,000/-), 2nd (Rs. 600/-) and 3rd (Rs. 400/-) prizes.

6. Science Essay Competition

The 7th Intra Board Science Essay Competition on "Science and Modern World" was successfully arranged. The Foundation received 32 prize winning entries from eight Board of Intermediate & Secondary Education as mentioned above. An amount of Rs. 21,600/- million was awarded to the winning students through their respective Boards. Amount of the prizes was Rs. 1000/-, Rs. 600/- and Rs. 400/- for 1st, 2nd and 3rd respectively.

7. Leaflets on Science Related Themes

Write up in urdu for the following seven leaflets on science related themes were finalized and sent to PASTIC for printing. An amount of Rs.0.2475 million was released to PASTIC National Center, Islamabad on account of printing 50,000 copies each of these leaflets.

لینا
شہد کی مکتی
مستحک زمین طبع
شمسی توانائی
پولن الرجی
ناسل فیول
ماحولیاتی آلودگی

An urdu article on "Plastic Use" was edited and compiled for PSF leaflets project. Its urdu calligraphy has also been completed.

8 Donation of Science Books and Magazines

The Foundation continued distribution of science books and magazines to educational institutes free of cost. Monthly 'Science Digest' is purchased and distributed on regular basis. During the year, 800 schools on the mailing list of the Foundation were sent the monthly magazine.

A book entitled "Muslims: The Pioneers of Modern Science" written by Dr. A. R. Nowshervi, Professor of Chemistry, University of Peshawar, was purchased for distribution to various institutes. Another book entitled "Genetic Improvement of Native Cattle through Cross Breeding and Introduction of Exotic Dairy Cattle in Pakistan" by Dr. Ulfat Un Nabi Khan, Principal Scientific Officer, National Agricultural Research Center, PARC, Islamabad was published by the Foundation and distributed free of cost to more than 200 institutions of the country and abroad.

9. Science Caravan (Mobile Science Exhibition)

The Science Caravan Units for NWFP, Sindh and the Federal areas continued their activities to arrange science exhibition in schools within their jurisdiction. Some of these activities are outlined below.

a) Federal Unit

On the occasion of Defense Day of Pakistan, the Oil and Gas Development Corporation (OGDC) organized a Fair, wherein, the Sciencey Caravan, Federal Unit also arranged its exhibition at Rawal Dam, Islamabad on 7.6.1994. The Unit accompanied the NWFP Unit of Science Caravan to arrange planetarium shows from 7.8.1994 to 1.9.1994 in District Chitral, where, 2700 students of 36 different schools witnessed the exhibition. The Unit also accompanied the NWFP Unit to arrange planetarium shows in District Dera Ismail Khan from 22.11.94 to 8.12.1994. Some 2000 students of 18 schools witnessed the exhibition.

The Federal Unit also participated in the computer exhibition at Lahore from 29-31 December, 1994 and put up its exhibition. A large number of students and general public visited the exhibition. The Unit then arranged its exhibition at National Museum of Science & Technology, Lahore, from 2-6 January, 1995. More than 4000 students of schools and colleges, and the general public witnessed the exhibition.

The Science Caravan Federal Unit participated in Science Fair, arranged by the Board of Intermediate and Secondary Education, Faisalabad, from 8-12 January, 1995. 6000 student of schools and colleges of Faisalabad saw the exhibition.

The Federal Unit arranged its exhibition at Pakistan Museum of Natural History, Islamabad (16-18 March, 1995) for the Members of Standing Committee of National Assembly on Science & Technology, and during the Khyber Carnival organized by PASTIC in collaboration with PSF at PCSIR Laboratories Complex, Peshawar, from 25-30 April, 1995. The Unit also participated in the science exhibition organized by Ghulam Ishaque Khan Institute for Science & Technology, Topi, during 23-26 May, 1995. 2000 students of the Institute and from local schools and general public witnessed the exhibition. During June 13-26, 1995, the Unit arranged planetarium shows in Nathia Gali, Abbottabad for 12 schools.

b) NWFP Unit

The Science Caravan NWFP Unit arranged its exhibitions for more than 86 schools of Districts Chitral, Peshawar, D.I. Khan, Mardan and Abbottabad during the year in addition to an exhibition on the occasion of Khyber Carnival Peshawar in April 1995.

c) Sindh Unit

The Science Caravan Sindh Unit arranged its exhibition in Ghotki and Mirpur Mathelo where 4080 students from various schools visited the exhibition.

d) Balochistan Unit

The appointments of staff for Balochistan Unit have been finalized and appointment letters have been issued. As soon as the staff joins, they shall be trained and the Caravan Unit to be stationed in Quetta will be launched in the Province.

10. Science Clubs in Schools

A proforma was circulated among the Science Clubs of Phase I and II to evaluate the performance of these clubs. The progress report of these clubs is being received by the undation.

Foundation is receiving back the proforma circulated to the schools in connection with the establishment of Science Clubs Phase III and are being scrutinized to ascertain the facilities available in these institutions and their interest in the program.

Twelve General Science books published by M/S Feroze Sons (Pvt.) Ltd., Rawalpindi were selected and 1000 copies each of the books were purchased for distribution among the members of the High School Science Clubs Program. It involved an expenditure to the extent of Rs.0.6767 million.

A booklet entitled "Project for High School Science Clubs" has been finalized. This booklet includes eight major projects and five income generating projects. Each project comprises 3-5 relevant experiments. The book has been sent to PASTIC National Center for printing 1000 copies.

i

PAKISTAN MUSEUM OF NATURAL HISTORY (PMNH)

PMNH is a subsidiary organization of Pakistan Science Foundation and was 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 and fossils of the country.

All PMNH personnel, including its scientists, artists and technicians continued with their research and educational activities. In spite of relatively poor funding position, a lot of research activities continued due mainly to international collaborative programs. A total of 26 field trips were undertaken by the scientists of the three science divisions, viz; Botanical Sciences, Earth Sciences and Zoological Sciences Division. The most outstanding of these trips was the one to Sindh Province. This trip which was partly funded by Pakistan Science Foundation resulted in extensive collection of material as well as generation of many new research ideas. A large number of floral, faunal and geological samples were collected during the trips.

Laboratory studies of the collected material and analyses of data progressed at a fairly brisk pace in the refurbished laboratories in the new building. Three new computers were also installed in the laboratories which has greatly facilitated the cataloguing and building of a database for all PMNH specimens. The international collaborative program with many foreign organizations such as Florida State Museum, Oxford University and ETH, Switzerland continued in earnest. All this research activity resulted in the publication of 13 papers in journals of international repute. In addition PMNH received a grant of Rs.88.0 million from the Ministry of Science & Technology for carrying out specific research projects.

Students and general public continued to visit PMNH display center and display corner, which were also renovated and expanded during the period under review.

An account of activities during the year 1994-95 is given below:

1 BOTANICAL SCIENCES DIVISION

a) Reference Collection

Nine field trips were undertaken to Tharparkar, Karachi, Faisalabad, Tarbela, Lahore, Karakorum, Salt Range area, Islamabad and adjoining areas, and 1300 higher plant specimens, 90 mycological specimens and 30 bottles of algal specimens were collected.

b) Laboratory Work

Preservation, mounting and labeling of 1300 higher plants, 90 mycological specimens and 30 algal bottles was carried out, and 980 higher plants, 55 mycological specimens and 30 algal samples were identified.

c) Extension Work and Services Rendered to other Organizations

- Identified 800 plant specimens for the students of various educational institutions of Rawalpindi-Islamabad.
- Services for the arrangements of "The National Conference of Plant Scientists" organized by Pakistan Botanical Society were provided to the botanists at National Agricultural Research Center (NARC), Islamabad.
- Botanists of PMNH, participated in the Reading University, UK and Pakistan Science Foundation's collaborative venture entitled "Karakorum Expedition" to cover the floral studies part of this extensive expedition.
- Provided services to Academy of Sciences, regarding preparation of COMSTECH Symposium on "Science in Islamic Polity in the twenty first century".

d) Publications

- Shinwari, Z.K. et. al. (1994). Phylogenetic relationship among genera in the Liliaceae-Asparagoideae-Polygonatae sensulato, inferred from rbcL gene sequence data. *Plant. Syst. Evol.* 192: 164-177.
- Ahmad, S. and M. Shah, (1995). Chenopodium in Gilgit Agency, (N. Pakistan). *J. Nat. Hist. Bull. Inst. Chiba* Vol. 3(2): 161-168.
- Fukiohara and Z.K. Shinwari (1994). Seed coat anatomy of the Northern Hemisphere Unlariaceae (Liliaceae) systematic implications. *Acta phytotaxon. Geobot.* 45(1): 1-14.
- Shinwari, Z.K., Taranchi, R., Utech, F.K. and Kawan, S. (1994). Recognition of the new world Disporum section Prosartes as Prosartes (Liliaceae) based on the sequence data of the rbr gene. *Taxon* 43: 353-366.
- Shah, M. and F. Bano. (1994). Economic importance of Potentilla sp. in Pakistan and Kashmir. *Sci. Tech. Development* Vol. 13(2): 56-58.

2. EARTH SCIENCES DIVISION:

a) Reference Collection

A total of 8 field trips were made to Abbottabad, Margalla Hills, Salt Range, Mirpur, Nathiagali, Swat, Kohistan, Malakand and Tharparkar. Also carried out field studies in Nevada State, USA. 170 invertebrate fossils and 400 rock/mineral samples were collected during these field trips.

b) Laboratory Work

After washing and sieving the sediments collected, 516 invertebrate fossils were isolated and catalogued. In addition, 400 rock and 95 mineral samples were also

catalogued and analyzed. Thin sections of 74 samples were prepared, while petrographic studies and megascopic studies of 100 samples were made.

c) Extension Work and Services Rendered to other Organizations

- Explained the geology and economic importance of mineral areas of central Salt Range to interested private sector group.
- Identified 35 rock/mineral samples for students of Rawalpindi-Islamabad.
- Provided technical assistance to the CDA officers for the preparation of Jurassic Park. Prepared plans for the same, which were approved by the competent authority.
- Collaboration with ETH, Switzerland and Punjab University in a joint project on "Structural Studies of the Melange Zone along Main Mantle Thrust and Associated rocks of the area" continued at a fairly rapid pace.

d) Publications

- Baqri, S.R.H., G. Roohi, and M. Sarwar (1994). On the discovery of the ostrea bed (bivalvae) at the base of Patara Formation, exposed at Baghanwala. Proceedings of Pak. Congr. Zool. Vol.11: 89-93.
- Hussain, S. and H. Dawood (1994). Geology of the lead-zinc-Molybdenum-copper and iron of Besham-Kohistan area, NWFP, Pakistan. Kashmir J. Geol. Vol. 11-12.
- Flynn, L.J. and I.U. Cheema (1994). Baluchimyline rodents from the Zinde Pir Dome, Western Pakistan. Systematics and Biochronologic implications. Nat. Sci. Mus. Tokyo. Monograph No.8: 115-121.
- Hussain, S. (1994). Position of MCT and subdivision of Himalayas in Swat, Pakistan. Proceeding of GEOSAS-1, held in Islamabad as Geology in South Asia - I.

3. ZOOLOGICAL SCIENCES DIVISION

a) Reference Collection

Nine field trips to different parts of Sindh, Islamabad, Gilgit and Hunza Valleys, along the International boundary of Khunjrab Pass, Skardu, Azad Kashmir, Mandra, Gujar Khan, Fateh Jang etc were made and 500 fishes, 75 mammals, 230 amphibians, 25 reptiles, 15 birds and 800 invertebrate specimens were collected.

b) Laboratory Work

Preservation of 1450 specimens was done and 800 insects and 200 fishes were catalogued. Identification of 270 fishes and 70 invertebrates was done and stuffing of 17 specimens was completed while 56 birds were skinned.

c) Extension Work and Services Rendered to other Agencies

- Expertise was provided to IPSET trainee teachers regarding Museum techniques with special emphasis on taxidermy and skinning of faunal specimens.
- Assistance was provided to NARC scientists during the 15th Zoological Congress.
- Quaid-i-Azam University students were assisted and guided in chromosomal studies of fish.

d) Publications

- Hasan, S.A. (1994). Two new species of the genus *Plautic* stal (Heteroptera: Pentatomidae) from the Malayan sub-region. Pak. J. Sci. Ind. Res. 36(11): 468-472.
- Hasan, S.A. (1994). A cladistic analysis of the tribes of the pentatomidae (Heteroptera). Japan J. Bot. 61(4): 651-669.
- Khatoon, S. (1993). Effect of water pollution on the macro-fauna of Leh stream, Islamabad and Rawalpindi. Proc. Pak. Congr. Zool. 13: 355-365.
- Khatoon, S. (1994). Freshwater oligochaetes, (Clitellata: Tubificurdea). Pak. J. Sci. Ind. Res. 36(12): 531-534.

4. PUBLIC SERVICES DIVISION

a) Museum Display and Maintenance

- Carried out renovation of the Marghazar Display Corner.
- Carried out calligraphy in urdu for the script of brochures on eight different topics.
- Prepared artwork for the brochure regarding an international symposium preparations on "Biodiversity of Pakistan" to be held on 7-8 November, 1995.
- Specified on drawings points for lights, fans, plugs and switches for the contractors of the new PMNH block.
- Painted six plinths and wooden boxes in the Salt Range Diorama.
- Designed two different visuals for signs of the PMNH for facade of the new building.
- Fixed security lights near the boundary of the new PMNH building.
- Cataloguing of negatives of all previous PMNH activities is in progress. Prepared 50 contact sheets of the same.
- Proposals for the interior designing/decoration of the PMNH building were prepared and submitted.
- Designed and prepared symbols and illustrations for PMNH Newsletter.
- Prepared drawings of second block of PMNH building showing proposed plan of the Public Services Division.

b) Educational Activities

- Guided tours were provided to 3380 students and 392 teachers of various educational institutions.
- Different museology techniques like taxidermy, model preparation, skinning etc. were taught to two groups of trainee teachers of a course organized by IPSET in collaboration with PMNH.
- Film shows on "Science and Natural History" were periodically arranged for the students as part of educational activities.
- Cataloguing of video films of various scientific disciplines was carried out to facilitate the students/teachers to select the film.

c) Services Rendered to other Organizations/Professionals

- i. Academy of Sciences:** Organized the display of PMNH exhibits alongwith the erection of display structures on two floors of National Library Building, for Expo-94, organized for COMSATS meeting.
- ii. Pakistan Science Foundation:** Provided design consultancy, manpower and supervision for the construction of display structure at the site of Khyber Carnival, PCSIR Laboratories, Peshawar.
- iii. Ministry of Petroleum:** Constructed display structures for the exhibition on "Mining" organized by Ministry of Petroleum.
- iv. National Agricultural Research Centre (NARC):** Erected display panels for the Plant Scientists Conference (March 28-30, 1995) organized by Pakistan Botanical Society at NARC.
- v. Capital Development Authority:** Prepared proposals/plans for the construction of Jurassic Park in the Capital Park of Islamabad as desired by the CDA Chairman and got them approved.

d) Number of Visitors to Displays

A total of 15,590 and 79,200 people visited the Main Museum Display Center and Display Corner respectively during the year.

DEVELOPMENT PROGRAMME OF PMNH

Construction of PMNH Building

During the report period the construction of Block-I was completed and the three Science Divisions of the Museum, alongwith the Admn Wing, shifted to this block in December, 1994. The Contractor however, has not yet handed over the building.

Moreover, Tender Document is under preparation by the PMNH Consultants for initiation of the Block II of the PMNH Building during the next fiscal year so that the

display section of the Museum can also be shifted from the rented building in Sector F-7, Islamabad to the new premises. As there had been tremendous cost escalation in past 10 years this necessitated the revision of PC-I of Phase-II of PMNH. The same has been revised and submitted to Ministry of Science and Technology in May, 1995. An additional amount of Rs. 58.7 million will be required to complete a major portion of the PMNH building by the year 2000.

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 to Islamabad in 1974 with the name of Pakistan Scientific and Technological Information Centre (PASTIC) and placed under the administrative control of Pakistan Science Foundation.

PASTIC has its National Center at Quaid-e-Azam University campus Islamabad and one Sub-Center in each province at Karachi, Lahore, Quetta and Peshawar with the following objectives.

Objectives

- i. To collect, organize, 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 and the achievements made are produced below.

1. DOCUMENTATION DIVISION

a) Document Procurement and Supply Service:

A total of 2417 research articles were supplied against 3230 requests received in the National Centre and four Sub-centers of PASTIC during the year. Out of 1387

references, 308 from foreign sources and 1079 from local libraries were processed and supplied to the clients .

b) Bibliographic Services:

In all, 270 bibliographies comprising of 19943 references were prepared and supplied to the clients.

c) Abstracting and Indexing Services:

PASTIC publishes a quarterly journal, viz., Pakistan Science Abstracts based on the abstracts of the articles published in recent S&T research journals of Pakistan. During the year under report, the following were prepared:

- i) 597 abstracts were classified in connection with PSA 1993, Vol.33, No.3-4; PSA 1994, Vol.34, No.1-2 and PSA, 1994, Vol.34, No.3-4.
- ii) 51 abstracts were written out for the PSA 1993, Vol.33, No.3-4; PSA, 1994, Vol.34, No.1-2 and PSA 1994, Vol.34, No.3-4.
- iii) 3087 keyword entries were prepared in connection with PSA 1993, Vol. 33, No.3-4, PSA 1993, Vol.34, No.1-2 and PSA 1994, Vol.34, No.3-4.
- iv) Author Indexes of Pakistan Science Abstracts 1993 & 1994 were prepared.

d) Union Catalogue of Scientific Periodicals in the Libraries of Pakistan:

Union catalogue of scientific periodicals in the libraries of Pakistan was published during the period under review. This catalogue consists of serials holding record of 103 libraries. Directory of Scientific & Technological Periodicals of Pakistan was published.

2. PASTIC NATIONAL SCIENCE REFERENCE LIBRARY

- i) During the year, 1024 books, 5421 periodical issues and 175 documents were received. The number of references supplied was 1410.
- ii) Contents of 30 journals pertaining to biology were supplied to 150 clients under current contents service.
- iii) Photocopies of 34 articles were supplied to the clients under current contents service.
- iv) CD-ROM databases on: Life Sciences, Poltox, Proquest, Physical, Chemical and Earth Science, Sociofile and Medline were purchased and/or updated.

3. INTERNATIONAL LIAISON

- i. UNESCO/ASTINFO: CDS/ISIS package was provided to 16 organizations.
- ii. Micro IDAMS package was provided to 17 organizations.
- iii. INFOTERRA: Information on lead pollution in water/air, drinking water quality, solid waste, disposal, environmental policies, pesticide effects/pollution, forests fire, tannery effluents, wildlife, wetlands, iodine deficiency ozone layer, etc. was provided to the clients.
- iv. INFOTERRA mini project on collection of environmental legislation was carried out.
- v. CEHANET: 100 records were entered in the database and forwarded to CEHA.
- vi. Miscellaneous: i) Questionnaires from National and International agencies were filled out (ii) Training was provided on CDS/ISIS package to two officers from COMSATS and PMRC (iii) Course material was prepared for workshop on library/office automation in Azad Kashmir.

4. REPROGRAPHIC SERVICES

A total of 123 printing jobs were undertaken for 40 organizations including composing, offset and laser printings. Total Impressions = 1384585; Total pages = 3221; Total copies = 147095.

5. COMPUTERIZATION ACTIVITIES

a) Data Analysis:

i) 6350 pages were composed (ii) 614 records have been entered in database on research material in Pakistan (iii) PSA 1992 Vol.32, No. 1-2 & 3-4 and PSA 1993 Vol.33, No.1-2 was composed (iv) miscellaneous internal jobs of PASTIC were performed.

b) Software/Hardware Services:

Computer software, desktop publishing services and hardware repair facilities were provided to other S&T organization.

6. TECHNOLOGY INFORMATION

The May-October 1994 issues of Technology Information were published. These issues were supplied to 15 subscribers, total nos. of issues despatched was 150. November-December 1994 issues of Technology Information and January-February 1995 issues of Technology Information were composed.

7. IMPORTANT TECHNICAL MEETING/VISITS/FUNCTIONS:

- i) Pakistan Science Foundation and PASTIC organized a scientific and technological exposition namely "The Khyber Carnival" at PCSIR Laboratories in Peshawar from 26-29 April, 1995.
- ii) Second meeting of the Governing Board of the SAARC Documentation Centre held in New Delhi from 26-27 May, 1995, was attended by Director, PASTIC.
- iii) Pia Sovio Pyhala, Program Officer, UNEP/INFOTERRA who was on a private visit to Islamabad visited PASTIC which is the National Focal Point for INFOTERRA.

8. DEVELOPMENT PROJECTS

a. Strengthening of PASTIC Science Reference Library

Under a development project entitled: "Strengthening of PASTIC National Science Reference Library" PASTIC has so far acquired about 300 books and subscribed to 23 S&T journals (1238 issues) and following databases on CD ROM:

- Applied Science & Technology Index
- Science Citation Index for 1993 only
- MEDLINE from 1966 to 1993
- POLTOX from 1966 to date
- Life Sciences Collection
- PROQUEST
- SOCIOFILE
- Current Contents: Chem., Physics, & Earth Science.

b. Draft PC-I for four development projects i.e. Pakistan Science Abstracts, Technology Information Bulletin, Union Catalogue of S&T Periodicals and Bibliographic Services was prepared.

CHAPTER 2

ORGANIZATION AND ADMINISTRATION

The organizational structure of the Pakistan Science Foundation, Pakistan Museum of Natural History (PMNH) and Pakistan Scientific & Technological Information Centre (PASTIC) are given on the following pages.

The staff position in the Foundation, PASTIC & PMNH 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	4
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	5
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.	Operational Manager	1
5.	Associate Curator	11
6.	Exhibit Designer	1
7.	Administrative Officer	1
8.	Research Associate	21
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.	Despatch 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

PAKISTAN SCIENCE FOUNDATION FINANCIAL STATEMENTS JUNE 30, 1995

AUDITORS' REPORT TO BOARD OF TRUSTEES

We have audited the annexed Balance Sheet of PAKISTAN SCIENCE FOUNDATION as at June 30, 1995 and the related Receipts and Expenditure Account together with the notes forming part thereof for the year then ended and state that in our opinion the Balance Sheet, Receipts and Expenditure Account together with the notes forming part thereof respectively give a true and fair view of the state of the Foundation's affairs as at June 30, 1995 and of the surplus for the year then ended

We further certify that these accounts include receipts of Rs 34,974,000 comprises of grants received from Federal Government and we are satisfied with the propriety of disbursement thereof

Islamabad _____ 1996

Chartered Accountants

**PAKISTAN SCIENCE FOUNDATION
BALANCE SHEET AS AT JUNE 30, 1995**

	NOTE	1995 Rupees	1994 Rupees
GRANT AND LIABILITIES			
GENERAL FUND	2	27,098,967	15,011,971
RESEARCH SUPPORT GRANT	3	32,253,024	29,116,863
		<u>59,351,991</u>	<u>44,128,834</u>
CURRENT LIABILITIES	4	1,556,451	413,068
		<u>60,908,442</u>	<u>44,541,902</u>

The report of the auditors is set out on page 1.

The notes set out on pages 5 to 9 form an integral part of these accounts.

TRUSTEE

CHAIRMAN

**PAKISTAN SCIENCE FOUNDATION
BALANCE SHEET AS ON JUNE 30, 1995**

	NOTE	1995 Rupees	1994 Rupees
FIXED CAPITAL EXPENDITURE			
Operating fixed assets	5	7,075,611	5,816,823
Capital work in progress		<u>16,949,540</u>	<u>7,950,540</u>
		24,025,151	13,767,363
RESEARCH PROJECTS IN PROGRESS (C)		32,253,024	29,116,863
CURRENT ASSETS			
Receivables		-	180,000
Advances, deposits and prepayments	6	930,869	415,259
Cash and bank balances	7	<u>3,699,398</u>	<u>1,062,417</u>
		4,630,267	1,657,676
		<u>60,908,442</u>	<u>44,541,902</u>

The report of the auditors is set out on page 1.

The notes set out on pages 5 to 9 form an integral part of these accounts.

TRUSTEE

CHAIRMAN

**PAKISTAN SCIENCE FOUNDATION
RECEIPTS AND EXPENDITURE ACCOUNT
FOR THE YEAR ENDED JUNE 30, 1995**

	NOTE	1995 Rupees	1994 Rupees
RECEIPTS			
Development Grants		8,999,000	2,992,500
Non-Development Grants		<u>25,975,000</u>	<u>20,955,000</u>
		34,974,000	23,947,500
EXPENDITURE			
Non-Development Grants			
Scientific functions	8	10,113,311	9,028,007
Science survey		204,045	110,184
Other function	9	1,310,712	1,390,888
Administrative expenses	10	12,612,471	10,781,847
		<u>24,240,539</u>	<u>21,310,926</u>
		24,195,359	21,310,926
		<u>10,733,461</u>	<u>2,636,574</u>

The report of the auditors is set out on page 1

The notes set out on pages 5 to 9 form an integral part of these accounts

TRUSTEE

CHAIRMAN

PAKISTAN SCIENCE FOUNDATION
NOTES TO THE ACCOUNTS FOR THE YEAR ENDED JUNE 30, 1995

STATUS AND OBJECTS

PAKISTAN SCIENCE FOUNDATION (Foundation) is a statutory organization established under Pakistan Science Foundation Act, 1973 on the 2nd day of February, 1973. The main object of its establishment is to promote and finance scientific activities having a bearing on the socio-economic needs of the country.

1. ACCOUNTING POLICES

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

(I) GRANTS RECEIVED

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

(ii) RESEARCH SUPPORT GRANT

Research support grant has been accounted for on actual payment basis.

(iii) FIXED ASSETS

Fixed assets have been valued at cost less accumulated depreciation except lease hold land which is stated at cost. Depreciation on fixed assets is charged on reducing balance method, at the rates specified in note 5.

(iv) GENERAL

a) Figures have been rounded off to the nearest rupee.

b) Figures of the previous year have been regrouped and rearranged wherever deemed necessary for the purpose of comparison.

	1995 Rupees	1994 Rupees
2. GENERAL FUND		
Balance as on July 01	15,011,971	12,375,397
Development grant	1,353,535	-
Add: Balance transferred from Receipt and Expenditure Account	10,733,461	2,636,574
	<u>27,098,967</u>	<u>15,011,971</u>
3. RESEARCH AND SUPPORT GRANT		
Balance as on July 01	29,116,863	27,572,997
Add: Disbursement during the year	<u>7,827,790</u>	<u>6,015,166</u>
	36,944,653	33,588,163
Less: Project completed during the year	<u>4,691,629</u>	<u>4,471,300</u>
	<u>32,253,024</u>	<u>29,116,863</u>
4. CURRENT LIABILITIES		
Security Deposits	1,395,358	305,360
Accrued Expenses	<u>161,093</u>	<u>107,708</u>
	<u>1,556,451</u>	<u>413,068</u>

5. OPERATING FIXED ASSETS

Particulars	C O S T			DEPRECIATION				Written Down Value As at June 30, 1995
	As at July 01, 1994	Additions	As at June 30, 1995	Rate %	As at July 01, 1994	For the year	As at June 30, 1995	
Lease hold land	3,713,418	-	3,713,418	-	-	-	-	3,713,418
Motor vehicles	2,533,790	489,419	3,023,209	20	1,802,803	244,081	2,046,884	976,325
Office equipment	1,190,777	772,624	1,963,401	15	839,233	168,625	1,007,858	955,543
Science equipment	969,833	-	969,833	15	719,919	37,487	757,406	212,427
Furniture and Fixture	829,160	501,475	1,330,635	6	377,380	57,196	434,576	896,059
Airconditioners	194,974	-	194,974	15	165,557	4,563	169,120	25,854
Library books and films	389,438	22,804	412,242	5	100,699	15,577	116,276	295,966
Bicycle	680	-	680	20	656	5	661	19
1995 Rupees	9,822,070	1,786,322	11,608,392		4,005,247	527,534	4,532,781	7,075,611
1994 Rupees	9,651,387	170,683	9,822,070		3,666,952	338,295	4,005,247	5,816,823

	1995 Rupees	1994 Rupees
6. ADVANCES, DEPOSITS AND PREPAYMENTS		
Advances to staff	185.979	133.159
Deposits	5.500	5.500
Prepaid rent	739.390	276.600
	<u>930.869</u>	<u>415.259</u>
7. CASH AND BANK BALANCES		
Cash in hand	44.850	27.652
UNESCO Coupons	910.461	730.461
Cash at bank	<u>2,744.087</u>	<u>304.304</u>
	<u>3,699.398</u>	<u>1,062.417</u>
8. SCIENTIFIC FUNCTIONS		
Research and support grant	7.827.790	6.015.166
Scientific societies and professional bodies	519.020	585.000
Scientific conferences, meetings and seminars	705.000	520.000
Operation of science caravan	<u>1,061.501</u>	<u>1,907.841</u>
	<u>10,113,311</u>	<u>9,028,007</u>
9. OTHER FUNCTIONS		
Science centers and herberia	74.000	-
Information and documentation	8.706	149.600
Awards, prizes and fellowships	102.200	128.650
International liaison	192.216	207.956
Science promotion activities	933.590	636.682
Scientist pools	-	168,000
Science fair	-	100.000
	<u>1,310,712</u>	<u>1,390,888</u>

	1995 Rupees	1994 Rupees
10. RESEARCH AND SUPPORT GRANT		
Salaries and other benefits	8,155,952	6,481,226
Travelling	269,876	82,095
Rent	1,682,063	2,105,156
Electricity, gas and water	209,724	125,477
Postage, telephone and telegram	754,691	763,271
Printing and stationery	175,955	109,329
Vehicle running and maintenance	483,078	522,625
News papers and periodicals	33,509	37,200
Liveries and uniforms	37,802	6,309
Entertainment	50,456	24,590
Repair and maintenance	66,471	45,440
Audit fee	12,500	12,500
Advertisement and publicity	113,263	66,882
Law charges	3,000	-
Haj expenses	-	51,680
Depreciation	527,534	338,295
Miscellaneous	36,597	9,772
	<u>12,612,471</u>	<u>10,781,847</u>

PAKISTAN SCIENCE FOUNDATION ACT 1973

**National Assembly of Pakistan
Islamabad, the 2nd February, 1974**

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 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 use and be used.
 - 3) The Head Office of the Foundation shall be at Islamabad.

4. FUNCTIONS OF THE FOUNDATION: (1) The Foundation shall function as a financing agency to:-

- i) the establishment of comprehensive scientific and technological information and dissemination centers;**
- 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 centers, clubs, museums, herbaria and planetaria;**
- v) the promotion of scientific societies, associations and academies engaged in spreading the cause of scientific knowledge in general or in the pursuit of a specific scientific discipline of technology in particular;**
- vi) the organization of periodical science conferences, symposia and seminars;**
- vii) the exchange of visit of scientists and technologists with other countries;**
- viii) the grant of awards, prizes and fellowships to individuals engaged in developing processes, products and inventions of consequence to the economy of the country; and**
- ix) special scientific surveys not undertaken by any other organization and collection of scientific statistics related to the scientific effort of the country.**

2) The Foundation shall also;

- i) review the progress of scientific research sponsored by it and evaluate the results of such research;**
- ii) maintain a National Register of highly qualified and talented scientists of Pakistan including engineers and doctors, in or outside the country and to assist them, in collaboration with the concerned agencies in finding appropriate employment; and**
- iii) establish liaison with similar bodies in other countries**

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

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

Whole-time members

- i) the Chairman
- ii) one eminent scientist;
- iii) the Director of Finance; to be appointed by the President;

Part-time members

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

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

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

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

8. **MEETING OF THE BOARD:-** (1) The meeting of the Board shall be held at least twice a year and shall be presided over by the Chairman or, in his absence, by its whole-time scientist member. (2) All decisions at a meeting of the Board shall be taken by a majority of the votes of the members present and voting.

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

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

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

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

groups of scientific workers and to review and evaluate the results of research sponsored by the Foundation.

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

- a) grants made by the Federal Government and the Provincial Governments;
- b) 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 within the meaning of the Chartered Accountants Ordinance, 1961 (X of 1961) and are appointed by the Foundation in consultation with the Auditor-General of Pakistan.

16. APPOINTMENT OF OFFICERS AND SERVANTS:- (I) 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.

Annexure-II**LIST OF PROJECTS SANCTIONED DURING 1994-95**

PROJECT TITLE & NO.	NAME & ADDRESS OF THE PRINCIPAL INVESTIGATOR	COST
Biodegradable and Safer Nematicides from Natural Resources. S-KU/ Chem (240)	Dr. M. Iqbal Choudhry Associate Professor, H.E.J. Research Institute of Chemistry, University of Karachi, Karachi.	180509
Synthesis, Structure & Pharmacological Studies on Some New 4,1-Benzozaphine, 2,5-Diones. C-QU/Chem (265)	Dr. Naeema Khan Associate Professor, Department of Chemistry, Quaid-i-Azam University, Islamabad.	330255
Synthesis of N,N-dialkylbenzylamine Derivatives and their Evaluation as Chelating Organic Reagents. P-PU/Chem (278)	Prof. Dr. Mohammad Zafar Iqbal Institute of Chemistry, University of the Punjab, Lahore.	111914
Preparation and Characterization of Reforming Catalysts. F-PU/Chem (286)	Dr. Mohammad Ilyas Professor, Centre of Excellence in Physical Chemistry, University of Peshawar, Peshawar.	240312
Drainage and Long Range Interaction in Polymer Solutions. F-PU/Chem (287)	Dr. M. Saleem Khan Assistant Professor, Centre of Excellence in Physical Chemistry, University of Peshawar, Peshawar.	196022
Utilization of Dragonflies as Biological Control Agents against some Insect Pests of Rice. AJK-UCR/Bio (218)	Dr. Abdul Khaliq Associate Professor, University College of Agriculture, Rawalakot, Azad Kashmir.	241281
Development of <i>Aspergillus niger</i> Strain for Citric Acid Fermentation of Molasses. P-GC/Bio (221)	Dr. Ikram-ul-Haq Department of Botany, Government College, Lahore	264424
Amaranthin Production Through Cell Suspension Culture of <i>Celosia Cristata</i> . P-CSIR/Bio (223)	Dr. A.F.M. Ehteshamuddin Chief Scientific Officer, Biotechnology and Food Research Centre, PCSIR Laboratories Complex, Lahore.	346636

Improving Maize Yield through Substrate Dependent Microbially Derived Plant Hormones. P-AU/Agr (119)	Dr. Muhammad Arshad Department of Soil Sciences, University of Agriculture, Faisalabad.	302195
Host Plant Resistance of Bio-regulator Treated Cotton to Bollworms and Sucking Complex, and its Impact on Yield and Yield Components. S-AEARC/Agr (141)	Dr. Abdul Rehman Bughio Principal Scientific Officer, Atomic Energy Agricultural Research Centre, Tandojam.	331908
Integrated Pest Management of the Pests of chick pea in Hyderabad District. S-AU/Agr (156)	Dr. Muhammad Khan Lohar Department of Entomology, Sindh Agriculture University, Tandojam	220932
Evaluation of the Economics of Various Rice based Cropping Systems under Dera Ismail Khan Conditions. F-GU/Agr (158)	Dr. Khalil Ahmed Department of Agronomy, Faculty of Agriculture, Gomal University, D.I.Khan.	317628
Some Physio-Chemical Studies on Alternate Bearing in Apple in Azad Kashmir. AJK-UCR/Agr (159)	Dr. Yusuf Ali University College of Agriculture Rawalakot, Azad Kashmir	209610
Exploitation of Mutagenesis and Selection for the Genetic and Agronomic Improvement of <i>Olerierous brassicae</i> . S-AEARC/Agr (171)	Dr. Abdul Ghafoor Arain Head, Plant Genetic Division, Atomic Energy Agricultural Research Center, Tandojam.	298248
Production and Evaluation of Immunopotentiators Adjuvanted Haemorrhagic Septicaemia Vaccine in Continuous Culture. P-NIAB/Bio (243)	Dr. Tariq Javed Senior Scientific Officer, Biological Chemistry Division, Nuclear Institute for Agriculture and Biology, (NIAB), Faisalabad	212060
Screening of Pregnant Women for Diabetes Mellitus. S-DMC/Med (150)	Prof Noor Jahan Samad Professor of Gynae Obst, Dow Medical College, Karachi	536387
A Study of Prevalence of Pollen Allergies in Islamabad. C-NIH/Med (149)	Dr. Shahid Abbas Senior Scientific Officer, Department of Immunology, National Institute of Health, Islamabad	194718

A Study of the Electrical Behaviour of Organometallic Polymers. C-QU/Phys (82)	Dr. Mazhar Hussain Chohan Assistant Professor. Department of Electronics, Quaid-i-Azam University, Islamabad.	504140
Numerical/Theoretical Study of Lase Light Propagation and Energ Deposition and Thermal Transport i Laser-produced Plasma an Computational Study of Z-Q Pinc Plasma C-QU/Phys (89)	Dr. Arshad Majid Mirza Assistant Professor. Department of Physics, Quaid-i-Azam University, Islamabad.	189616
Electric and Diffractive Scattering and QCD Based Phenomenology. P-PU/Phys (91)	Dr. Fazal-e-Aleem Associate Professor. Centre for High Energy Physics, University of the Punjab, Lahore.	175032
Analytical Investigations of Non-Linear Waves in Semi-Conductor Superlattice Plasmas. P-PU/Phys (99)	Dr. H. A. Shah Assistant Professor. Centre for Solid State Physics, University of the Punjab, Lahore.	182076
Fabrication of Cadmium Telluride Photovoltaic Solar Cells by Close-spaced Sublimation. P-CEHME/Phys (103)	Lt. Col. Dr. Nasim A. Khan Officer-in-Charge. Research and Development, College of Electrical and Mechanical Engineering, Rawalpindi.	509682
Strategies for Biological Control of Root Knot and Cyst Nematodes on Selected Hosts in Pakistan and China. NSFC/Res (1)/Agr	Dr. M. A. Maqbool Director, National Nematological Centre, University of Karachi, Karachi.	361335
Development of Thermostable Cellulose System for the Bio-conversion of Lignocellulosic Biomass. NSFC/Res(10)/Chem	Dr. Waheed Akhtar Professor, Institute of Chemistry, University of the Punjab, Lahore.	474463
Use of Zeolite for the Removal of Heavy Metals of Environmental Importance from Aqueous Solution. PSF/NSFC/Res(4)Chem	Dr. M. Afzal Professor. Department of Chemistry, Quaid-i-Azam University, Islamabad.	193367

Phytochemical Studies on the
Bioactive Principles of *Withiana*
species.
PSF/NSFC/Res(3)Chem

Dr. Atta-ur-Rehman
Director, HEJ Institute of Chemistry,
University of Karachi, Karachi.

477786

Annexure-III**GRANTS-IN-AID TO SCIENTIFIC SOCIETIES AND INSTITUTIONS DURING 1994-95**

<u>Scientific Societies/Learned Bodies</u>	<u>Amount Released</u>
Pakistan Academy of Sciences	Rs. 1,00,000/-
Pakistan Association for the Advancement of Science	Rs. 50,000/-
Zoological Society of Pakistan	Rs. 30,000/-
Pakistan Botanical Society	Rs. 25,000/-
Biological Society of Pakistan	Rs. 25,000/-
Pakistan Society of Biochemists	Rs. 15,000/-
Chemical Society of Pakistan	Rs. 30,000/-
Institution of Engineers, Pakistan	Rs. 20,000/-
Pakistan Society of Nematologists	Rs. 10,000/-
Pakistan Thalassemia Welfare Society	Rs. 20,000/-
Pakistan Society for Semi-Conductor Science & Technology	Rs. 15,000/-
<u>Scientific Journals</u>	
Journal of Science, Technology and Development	Rs. 20,000/-
Mehran University Research Journal of Engineering & Technology	Rs. 10,000/-
Pakistan Journal of Forestry	Rs. 10,000/-
Pakistan Oral & Dental Journal	Rs. 10,000/-
Journal of Natural Science and Mathematics	Rs. 10,000/-
Urdu Journal Tehqique	Rs. 10,000/-
Pakistan Journal of Marine Sciences	Rs. 20,000/-
Total	Rs. 4,30,000/-