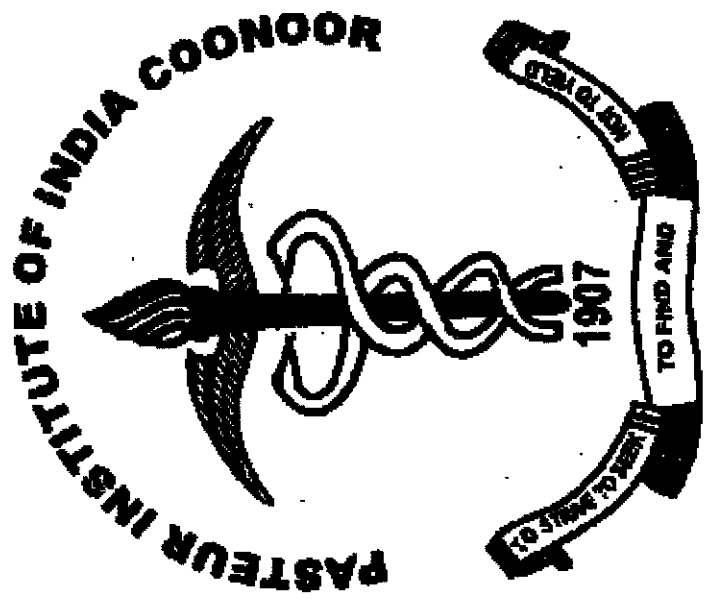


**PASTEUR INSTITUTE OF INDIA**  
COONOR 643 103, NILGIRIS.  
TAMILNADU



**ANNUAL REPORT**

**2014 - 2015**

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**ASSISTANT RESEARCH OFFICERS**

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Dr. S. Jagannathan, M.Sc., Ph.D.,

**DPT GROUP OF VACCINES****SENIOR RESEARCH OFFICER**

Dr. (Smt.) Jeeva Kalai Selvan, M.B.B.S.,

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Smt. Shanthi Mani, M.Sc.,

Shri R. Mohan, M.Sc.,

**ASSISTANT RESEARCH OFFICERS**

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Smt. T. Lalitha, M.Sc.,

Smt. Chandra Charles, M.Sc.,

Shri B. Annamalai, M.Sc., PGD.M.L.T.,

*To strive to seek to find and not to yield***ASSISTANT TECHNICAL OFFICERS**

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Shri K. Krishnamurthy

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**SENIOR P.A. TO DIRECTOR**

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**ACCOUNTS DEPARTMENT****ACCOUNTS OFFICER**

Vacant

**PURCHASE, STORES DEPARTMENT****STORES OFFICER**

Shri S. Chandrasekaran, B.Com., M.A.,

**LABORATORY ANIMAL DIVISION****VETERINARY ASSISTANT SURGEON**

Dr. Anjan Jyoti Nath, M.V.Sc.,

**ASSISTANT RESEARCH OFFICER**

Dr. C. Muniandi, M.Sc., Ph.D.,

**LIBRARY****LIBRARY AND INFORMATION OFFICER**

Vacant

**MAINTENANCE SECTION****MAINTENANCE OFFICER**

Shri J. Kamaludeen

**DISPENSARY****SENIOR MEDICAL OFFICER**

Dr. (Smt) Sibani Barman, M.B.B.S.,

**MEDICAL OFFICER**

Dr. Samyak Sahu, M.B.B.S.,

**ASSISTANT TECHNICAL OFFICER**

Shri M. Gopal



**DIRECTOR'S MESSAGE**



This year, our Institute has been in the midst of busy activities both at the production of vaccines and on the establishment of GMP facility for DPT group of vaccines, fronts. With regard to cGMP project, in addition to civil construction, other cGMP related works have also been taken up by this Institute. Tender documents for Water Treatment, Generation & Distribution System, Clean Room Modular Partition Works, Electrical Distribution Works have been completed and Design Qualification for Fermentors and Blending Vessel, Seed Fermentor Package, Filtration System Package, Mechanical Piping & Insulation Works, Fire Protection and Safety Works etc., have been finalized. The Purchase Orders have been issued for Fermentors and Blending Vessels and Factory Acceptance Test (FAT) for the same have been completed and were received in the Institute's premises also.

Second Local Monitory Committee Meeting to assess the progress of cGMP project was conducted with Dr. S. Manivannan, Deputy Drugs Controller (I), CDSCO, South Zone, Chennai as a Special Invitee.

This year, we have completed the supply of 100 lakh doses of DPT Vaccine as per the Supply Order issued by the Ministry of Health and Family Welfare, Govt. of India, New Delhi. In addition to that we also supplied an additional quantity of 6.70 lakh doses of DPT Vaccine. Thus, a total of 106.70 lakh doses of DPT vaccine have been supplied to UIP.

In continuation of the workshop for Assessing Rabies Free Status of Nilgiris District, Tamilnadu conducted in the last year, this year, the Department of Public Health and Preventive Medicine, Tamilnadu has organized the review meeting among all the stack-holders of the Co-ordination Committee formed by the District Collector of Nilgiris at PII, Coonoor. The technical support for the review meeting was rendered by PII, Coonoor.

In commemoration of the death anniversary of Louis Pasteur, this year also we celebrated 'World Rabies Day' on 28th September, 2014, organizing a Drawing Competition, Essay Writing and Quiz Competitions for School children and awarded prizes.

Our Rabies Diagnostic lab has received 264 samples from all over the country, for the estimation of Anti-rabies neutralizing antibodies by RFFIT using Murine Neuroblastoma-2A cells. As done in the previous years, in the reporting year also about 1624 patients received Anti Rabies Vaccines in our Anti Rabies Treatment Centre. Besides this we have undertaken Post Graduate students' course projects, industrial visits for college students and other academic activities.

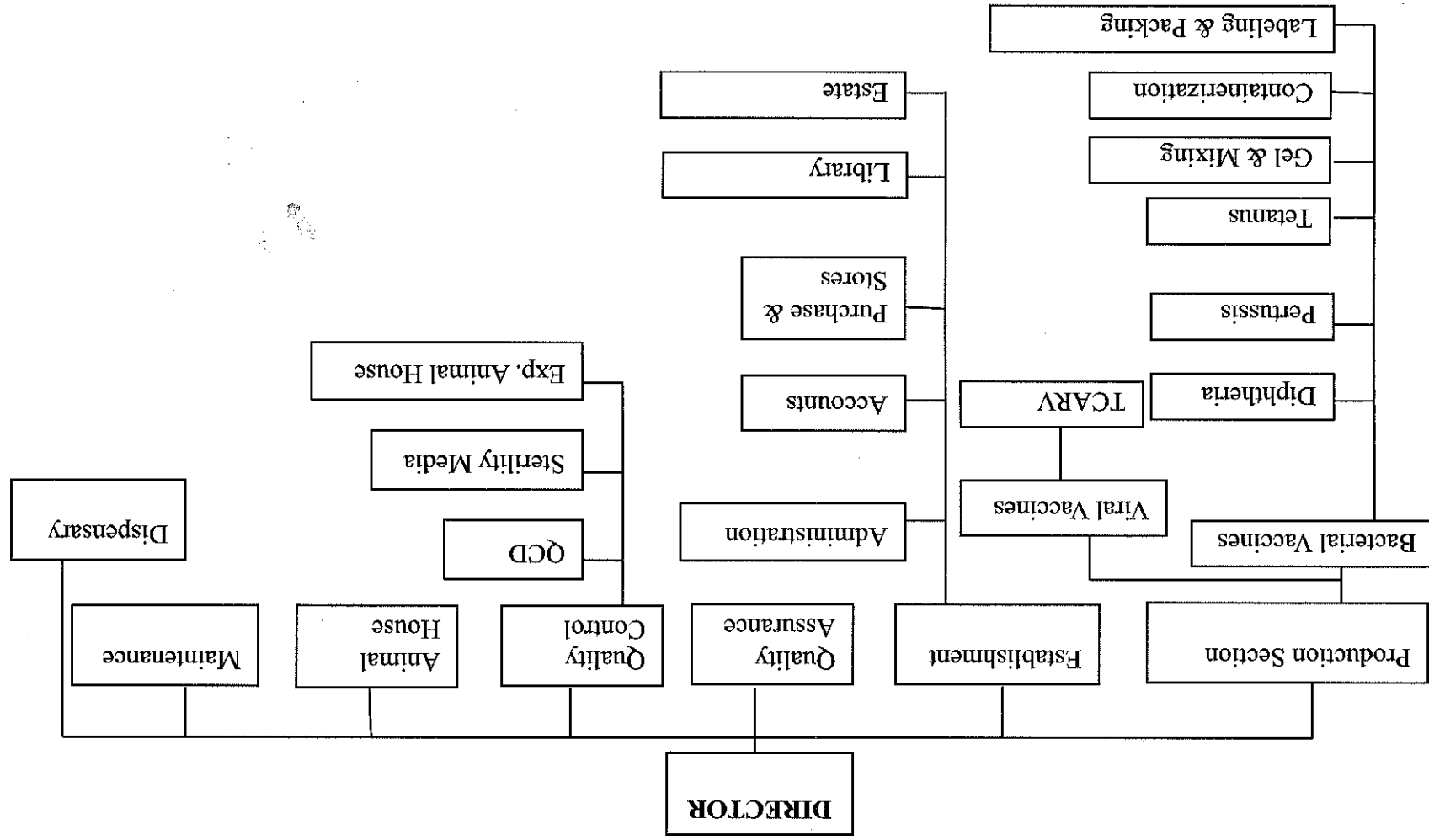
I sincerely thank the Secretary, Additional Secretary, Joint Secretary and all officials of Department of Vaccine Institute of Ministry of Health and Family Welfare, Government of India, for all the supports rendered during the reporting period. I thank all the officers and staff of PII, Coonoor for all the achievements witnessed in this year.

I wish the entire team of PII, Coonoor a great success in all their future endeavors.

**Dr. B. SEKAR,**  
DIRECTOR.



**ORGANOGRAM - PASTEUR INSTTUTE OF INDIA**



**CONTROLLING OFFICERS**

1. Director : Dr. B. Sekar, M.B.B.S., M.D.,  
 2. Assistant Director - I : Dr. K.N. Venkataramana, M.B.B.S., D.M.V.,  
 3. Assistant Director - II : Dr. B. Sundaran, M.Sc., Ph.D.,  
 4. Senior Research Officer-I : Dr. (Smt) Jeeva Kalai Selvan, M.B.B.S.,  
 5. Senior Research Officer-II : Shri C. Palaniappan, B.Sc., D.M.L.T.,  
 6. Senior Medical Officer : Dr (Smt) Sibani Barman, M.B.B.S.,

**RESPONSIBILITIES OF CONTROLLING & OTHER OFFICERS**

1. DIRECTOR  
 Chief executive officer of all activities associated with the Institute viz., Administration, Accounts & Finance, Production, QA, QCD, R&D.
2. ASSISTANT DIRECTOR-I  
 All activities associated with the production and supply of TCARV, Animal House, Maintenance section, Purchase, Stores Department, Estate Department and administrative duties assigned by the Director.
3. ASSISTANT DIRECTOR-II  
 All activities associated with the Quality Assurance Division and administrative duties assigned by the Director.
4. SENIOR RESEARCH OFFICER-I  
 Production of Diphtheria, Tetanus, Pertussis, Gel & Mixing Section, Containerization & Inspection and Labelling, Packing and Dispatch section.
5. SENIOR RESEARCH OFFICER-II  
 All activities associated with QCD (QCD, Sterility Media Section, Rabies Diagnosis Lab and Experimental Animal House).
6. SENIOR MEDICAL OFFICER  
 All activities associated with Dispensary.
7. ADMINISTRATIVE OFFICER  
 All activities associated with Administration, Establishment, Security, Legal and Vehicle movement and also Accounts.

**COMMITTEES****1. Department Purchase Committee**

- (a) Dr. B. Sekar, Director - Head of the Committee  
 (b) Dr. K.N. Venkataramana, Assistant Director  
 (c) Dr. B. Sundaran, Assistant Director  
 (d) Dr (Mrs) Jeeva Kalaiselvan, Senior Research Officer  
 (e) Shri C. Palaniappan, Senior Research Officer  
 (f) Shri A. Vairamoorthy, Administrative Officer  
 (g) Shri S. Chandrasekaran, Stores Officer

**2. Department Condemned Committee**

- (a) Dr. B. Sundaran, Assistant Director  
 (b) Shri C. Palaniappan, Senior Research Officer  
 (c) Shri R. Mohan, Research Officer  
 (d) Shri B. Annamalai, Assistant Research Officer  
 (e) Shri S. Chandrasekaran, Stores Officer

**3. Library Committee**

- (a) Dr. K.N. Venkataramana, Assistant Director - Member Secretary  
 (b) Dr. B. Sundaran, Assistant Director - Member  
 (c) Dr (Mrs) Jeeva Kalaiselvan, Senior Research Officer  
 (d) Shri C. Palaniappan, Senior Research Officer  
 (e) Dr. A. Premkumar, Research Officer  
 (f) Mrs. Savithri Sundaran, Research Officer  
 (g) Dr. Anjan Jyoti Nath, Veterinary Assistant Surgeon  
 (h) Mrs. Shanthi Mami, Research Officer  
 (i) Shri R. Mohan, Research Officer  
 (j) Dr. Samyak Sahu, Medical Officer

**4. Interim Staff Council****Official side**

1. Dr. B. Sekar, Director & Chairman, ISC  
 2. Shri A. Vairamoorthy, Administrative Officer & Secretary  
 3. Dr. K.N. Venkataramana, Assistant Director & Member  
 4. Dr. B. Sundaran, Assistant Director & Member  
 5. Shri C. Palaniappan, Sr. Research Officer & Member  
 6. Shri S. Chandrasekaran, Stores Officer & Member



<u>Staff side</u>	<u>Group</u>	<u>Representative No.</u>
1. Shri K.B. Balakrishnan	Technical Assistant	Rep. of Gr.01
2. Shri A. Sathar	Lab. Technician	Rep. of Gr.02
3. Shri B.B. Sundaram	Lab. Assistant & Dy. Leader	Rep. of Gr.03
4. Shri C. Doraiswamy	U.D.C.,	Rep. of Gr.04
5. Shri S. Gangadharan	MTS	Rep. of Gr.05
6. Shri A.K. Jithendran	MTS	Rep. of Gr.05
7. Shri K. Arumugam	MTS	Rep. of Gr.05
8. Shri T.G. Irudayaraj	Supervisor & Leader	Rep. of Gr.10
9. Mrs. B. Jayalakshmi	Lady Staff Representative	Rep. of Gr.13

### 1. Chief Vigilance Officer

Dr. B. Sundaran, Assistant Director

### 2. Liaison Officer for SC & ST employees

Dr (Mrs) Jeeva Kalaiselvan, Senior Research Officer

### 3. Central Public Information Officer and Appellate Authority under RTI Act

#### Central Public Information Officer:

- Dr. K.N. Venkataramana, Assistant Director
- Dr. B. Sundaran, Assistant Director
- Dr (Mrs) Jeeva Kalaiselvan, Senior Research Officer

#### Central Assistant Public Information Officer

Shri P. Sasikumar, Sr. P.A. to Director

#### Appellate Authority

Dr. B. Sekar, Director

## OVER VIEW

Pasteur Institute of India, Coonoor is one of the leading Institutions in the production of Antirabies Vaccine and DPT group of Vaccines for the Universal Immunization Programme (UIP) of Government of India.

### PREAMBLE

The Institute started functioning as Pasteur Institute of Southern India, on 6<sup>th</sup> April 1907 and the Institute took a new birth as the Pasteur Institute of India (registered as a Society under the Societies Registration Act 1860) and started functioning as an autonomous body under the Ministry of Health and Family Welfare, Government of India, New Delhi from the 10<sup>th</sup> of February, 1977. The affairs of the Institute are managed by a governing body. The Institute is functioning on a no profit no loss basis.

### GENESIS

The death of a young English lady Lily Pakenham Walsh, due to hydrophobia in the year 1902 who could not get antirabies treatment in time led to the establishment of Pasteur Institute of Southern India. Mr. Henry Phipps, American Philanthropist donated to Lord Curzon, the then Viceroy of India a sum of Rs.50.00 lakhs for the development of Medical Institutions, out of which, a sum of Rupees one lakh was allocated to start the Pasteur Institute of Southern India at Coonoor.

The cool and equitable climate led to the choice of Coonoor as the most suitable location for the construction of the Institute. Spread over an area of 16 acres of land the Institute is situated on a grassy knoll on the upper reaches of Coonoor town amidst beautiful surroundings with lush greenery, manicured lawns and flower gardens. It has a glorious tradition of single minded dedication to alleviate the suffering of humanity by its contribution to the research and development of vaccines in the country.

### SETTING THE PACE IN TECHNOLOGY

Pasteur Institute of India has consistently set the pace in innovating and adapting newer technology to suit Indian conditions and needs. It is this vast experience and expertise which makes it well equipped to meet the challenges of applying advanced technology in vaccine production. Among the major equipments available in the Institute are large bacterial fermentors, zonal centrifuge, industrial freeze drier, several bulk autoclaves, ovens, filling machines, large cold rooms, deep freezers, bioreactors, purified water system, WFI plant, TOC analyzer, column chromatography, oil & moisture free air compressor, Effluent Treatment Plant (ETP) and Sewage Treatment Plant (STP). Full fledged facility is available for Research and Development work which includes HPLC system, ultra centrifuge, ELISA equipment and equipment for molecular biology work.

The Institute is recognized by the Tamilnadu Dr. M.G.R. Medical University, Chennai for M.D degree in Microbiology and by the Bharathiar University for Ph.D in Microbiology, Biotechnology and Biochemistry in the faculty of Science.



## INSTITUTE'S PRODUCT PROFILE

*“Laboratories are the Temples of the future. It is there the man learns to read the works of nature”..... Louis Pasteur.*

- ❖ Production of Tissue Culture Antirabies Vaccine (Vero Cell Purified)
- ❖ Production of DPT group of vaccines viz., Diphtheria-Pertussis-Tetanus (DPT) Vaccine, Diphtheria-Tetanus (DT) Vaccine and Tetanus Toxoid (TT) Vaccine.

## OBJECTIVES

The objectives of the Society are to make available effective means of preventing the occurrence of rabies to spread the knowledge of such means among the public and to undertake research work on rabies, influenza, enteroviruses or any other diseases and for the following purpose.

- ❖ To prepare such other vaccines as may be in the National interest.
- ❖ To develop the Institute into an advanced service, post-graduate training and research center.
- ❖ To co-operate with International and National agencies engaged in biomedical research and training and arrange for inter-change of personnel, material and data.

## IMPORTANT MILESTONES

- 1907 Manufacture of Neural Tissue Antirabies Vaccine.
- 1957 The isolation of Asian Flu Virus during the pandemic and development of Influenza vaccine against the same virus.
- 1970 The Development of BPL-inactivated Rabies Vaccine for the first time in India which made the treatment easier and cheaper with less dose and less injections with a vaccine of increased potency.
- 1970 Research, Development, Production and Supply of Trivalent(Sabin) Oral Polio Vaccine for the first time in India
- 1982 Release of DPT group of vaccines for the National Programme of Immunization.
- 1988 Release of Tissue Culture Anti Rabies Vaccine for Canine Prophylaxis
- 2001 Development and release of Vero Cell Derived Purified Rabies Vaccine for human use at an affordable price to common man for the first time in India by Government controlled Institutions.
- 2003 This is the first Government sector vaccine Institute awarded with ISO 9001-2000 certificate by BVQI, UK in Quality Management System.
- 2006 Renewal of ISO 9001:2000 certificate for further period of 3 years by BVQI, UK for QMS



## FUTURE PLAN

- Creation of cGMP facilities for DPT group of vaccines.
- Creation of cGMP facilities for Tissue Culture Antirabies Vaccine.
- Research and Development of newer cost effective vaccines like Pentavalent vaccine

## INTERNATIONAL ACCREDITATION

This Institute has been accredited with International Organisation for Standardization (ISO) Certification 9001-2000 for its adopting Quality Management System during the year 2003-2004. This is the first Institute in the Public Sector which has been accredited with ISO 9001-2000 in the vaccine manufacture by International accrediting organization namely Bureau Veritas Quality International (BVQI), London. The certificate was valid upto 22.02.2009. The ISO standards are complementary in line with Good Manufacturing Practices (GMP) norms. The Certificate is issued only after conducting a series of audits to check whether all the standards of ISO are in compliance.

## PRESENT ACTIVITIES

- Production of DPT group of vaccines and TCAR vaccine in compliance with the revocation of production licence by the Ministry of Health and Family Welfare, New Delhi in February, 2010.
- Academic programmes like Ph. D. Microbiology, Biochemistry and Biotechnology (Part time & Full time) affiliated to Bharathiar University, Coimbatore and M.D (Microbiology) affiliated to Tamilnadu Dr. M. G. R Medical University, Chennai.
- Breeding of Mice and Guinea pigs for Experimental purpose like Quality Control of DPT group and TCAR vaccines.
- Institute has a Rabies Diagnostic Lab and treatment center to cater the need of the general public.

## INSTITUTE'S QUALITY POLICY

*“We are committed to produce Safe, Potent and Cost effective vaccines with continual improvements in our Quality system.”*

## DETAILS OF GRANT-IN-AID RECEIVED FROM THE MINISTRY OF HEALTH AND FAMILY WELFARE, NEW DELHI AND THE EXPENDITURE INCURRED, ETC., DURING 2013-14

The Ministry of Health and Family Welfare, New Delhi has released a total sum of Rs. 40.00 Crores to this Institute during the financial year 2013-14 vide the under mentioned Sanction Orders:



Sl. No.	Sanction Letter No. and Date	Amount (in Rs.)	Head
1.	Letter No.V.11011/06/2014-VI/1 dated 26.06.2014	6,00,00,000	General
2.	Letter No.V.11011/06/2014-VI/2 dated 26.06.2014	6,00,00,000	Salaries
3.	Letter No.V.11011/06/2014-VI/3 dated 10.12.2014	3,00,00,000	General
4.	Letter No.V.11011/06/2014-VI/4 dated 10.12.2014	3,00,00,000	Salaries
5.	Letter No.V.11011/06/2014-VI/5 dated 24.02.2015	4,00,00,000	General
6.	Letter No.V.11011/06/2014-VI/6 dated 24.02.2015	3,00,00,000	Salaries
7.	Letter No.V.11011/06/2014-VI/7 dated 03.03.2015	15,00,00,000	Capital
	<b>TOTAL</b>	<b>40,00,00,000</b>	

While releasing the Grant-in-Aid, the Ministry has, vide above letter informed that the normal expenditure of the Plan scheme including the administrative expenses of grantee institutions may be met from the above amount. The details of the head wise expenditure incurred are given below:

Sl. No.	Head of Account	Amount (Rs. in lakhs)
1.	Grants-in-General	962.47
2.	Grants for creation of Capital Assets	1488.50
3.	Grants-in-Aid Salaries (new)	1004.12
	<b>TOTAL</b>	<b>3455.09</b>

#### ACTIVITIES UNDERTAKEN IN RESPECT OF ESTABLISHMENT OF GREEN FIELD MANUFACTURING GMP FACILITY FOR PRODUCTION OF DPT VACCINE AT PIIC

- The Govt. proposed to create Green Field GMP facility for manufacturing DPT group of vaccines at PIIC. In this regard, HLL Lifecare Ltd., Trivandrum has been identified as Project Consultant. EFC has recommended for a total estimated non-recurring expenditure of Rs.137.02 crores plus the Project Management Consultancy Fee for HLL.
- In Nilgiris, the height of new building is restricted to 7 mts. and any proposal above 7 mts. requires approval of Architectural & Aesthetics Aspects (AAA) Committee and Hill Area Conservation Authority (HACA) committee. Accordingly, the layout has been submitted to the local municipal authorities for recommendation of the AAA/HACA committees. AAA Committee recommended and referred the proposal to HACA committee and the HACA has also approved in principle and the proposal has been forwarded to the Municipal Administration and Water Supply Department (MAWS) for final Orders. The MAWS has issued order relaxing the height restriction on 1-3-2013 and the final order is received during May, 2013 from the Local Municipal Authorities, Coonoor.
- Civil work for the new cGMP project was initiated in the month of June, 2013.



- After that Equipment Validation and Process validation will be undertaken. Then production of vaccine from the new facility will be initiated and completed with the certification of initial 3 consecutive batches by CDL.
- The proposed annual supply from the new facility will be: DPT- 60 Mld; TT -55 Mld; DT- 15Mld (Total- 130 Mld).

#### PROGRESS OF CIVIL CONSTRUCTION

- As on date 100% of the basic infrastructure work required for DP block has been completed in the form of constructing retaining wall and mass earth work excavation.
- 80% of the work for Diphtheria and Pertussis block has been completed in the form of concreting work up to plinth beam, Retaining walls, staircase, Columns up to GF, the Ground floor slab, GF masonry works, GF plastering works, FF masonry, Roof Beam, water proofing, External plastering, grade slab, VDF Flooring & Truss erection till March-15.
- 35% of the work for Formulation block has been completed in the form of footing, Columns, plinth beams, retaining wall concreting works and one part of GF slab shuttering.
- 75% of the work for Sterility and Microbiology Lab has been completed in the form of concreting up to GF Slab, GF masonry, Internal plastering, retaining wall, FF lintel, Roof beam, External plastering, Grade slab & VDF Flooring.
- 90% of the work for the Animal Experiment Block has been completed in the form of work up to Ground floor slab concreting, First floor lintels, block masonry, SS process drain pipe laying, grade slab, internal plastering works, External plastering, flooring & truss works.
- 60% of the work for the Utility Block has been completed in the form of retaining wall, GF slab concreting work, GF Masonry, staircase, water proofing and Grade slab.
- Tender value for civil construction is around Rs.24.67 crores, out of which, at this year, civil work amounting to Rs.8.89 crores worth has been completed which is 36.04% of the total civil project cost.

#### OTHER GMP RELATED ACTIVITIES

- Pre-Bid meeting on Water Treatment, Generation & Distribution system held on 10.04.2014 at HLL office, Chennai.
- Pre-Bid meeting on Clean Room Modular partition works held on 16.04.2014 at HLL office, Chennai.
- Pre-Bid meeting on Electrical distribution works held on 22.04.2014 at HLL office, Chennai.
- Purchase order has been placed for Fermentors and Blending vessels.
- User Requirements Specifications (URS) for other equipments have been finalized.
- Pre-Bid meeting on Water Treatment, Generation & Distribution system completed.
- Pre-Bid meeting on Clean Room Modular partition works completed.
- Pre-Bid meeting on Electrical distribution works completed.
- Meeting on finalization of Design Qualification for fermentors and Blending vessel among HLL/NNE Pharmaplan experts and the vendors along with the officers of PII, Coonoor was held on 6<sup>th</sup> June 2014 at PII, Coonoor.
- The CEO, HLL and other officers have visited PII, Coonoor to discuss the status of the DPT vaccine revival project on 2<sup>nd</sup> and 3<sup>rd</sup> July, 2014.



- A team of officers have visited M/s. Biozeen, Bangalore on 18.07.2014 for DQ approval of Fermentors and Blending equipments.
- The pre-bid meeting on seed fermentor package, MF system package, UF and Sterile Filtration equipment package held on 30<sup>th</sup> and 31<sup>st</sup> July, 2014 at Chennai.
- Kick-off meeting held on 7<sup>th</sup> and 8<sup>th</sup> August, 2014 at PII, Coonoor for Autoclaves and Dry Heat Sterilizer along with the team members from HLL Lifecare Ltd., M/s. Machin Fabric (sterilization vendor for PIIC) and M/s. NNE Pharma.
- Pre-bid meeting of Mechanical Piping & Insulation works held on 17<sup>th</sup> September, 2014 at M/s. HLL, Chennai.
- Pre-bid meeting of Fire protection and Safety works held on 17<sup>th</sup> September, 2014 at M/s. HLL, Chennai.
- Kick off meeting for Water treatment, generation & distribution works held at PII, Coonoor from 8<sup>th</sup> to 10<sup>th</sup> October, 2014.
- Meeting on Software FAT held at Bangalore from 12<sup>th</sup> to 17<sup>th</sup> October, 2014.
- The second Local Monitoring Committee (LMC) meeting was held at PII, Coonoor on 5-12-2014 with the members of LMC, Representatives of HLL and Special Invitee Dr. S. Manivannan, Deputy Drugs Controller (I), CDSCO, South Zone, Chennai to assess the activities carried out for the establishment of cGMP facility for the manufacture of DPT group of vaccines at PII, Coonoor. The MoM was also circulated to all the members of the LMC.
- Tender document in respect of seed fermentor, microfiltration system, ultrafiltration system approved on 16.12.2014.
- Approval of the Governing Body of PII, Coonoor for the time extension of civil contract from October 2014 to 31<sup>st</sup> August, 2015 was conveyed to M/s. HLL with a direction to compress the timeline to the original mandate schedule vide this office letter dated 23-12-2014.
- The Maintenance Officer of this Institute has attended kick off meetings held at PII, Coonoor on 13<sup>th</sup> & 14<sup>th</sup> January, 2015 regarding electrical distribution works and for mechanical piping and insulation works.
- Kick-off meeting for filling line was held on 28-1-2015 at PII, Coonoor. The representatives from HLL, NNE Pharma, Romaco, Fabtec and Director & officers of PII, Coonoor were attended the meeting.
- The Officers from PII, Coonoor visited M/s. Biozeen, Bangalore for the period from 2-2-2015 to 7-2-2015 for the Factory Acceptance Test (FAT) for Fermentors & Blending Vessels.
- Review meeting on FAT was held with HLL, Vendors & PII, Coonoor on 16-2-2015 at PII, Coonoor.
- After the completion of Re FAT, the equipments have been received in our premises.

To strive to seek to find and not to yield

## PRODUCTION DIVISION

The Pasteur Institute of India has been producing the DTP group of vaccines viz., DTP, DT and TT vaccines as its main product, along with sheep brain anti rabies vaccine. The Institute has successfully developed indigenous technology for manufacturing of Vero cell derived and purified vaccine for human use. The Sheep brain anti rabies vaccine, usually referred as ARV (NT) was phased out.

Prior to suspension of the Drug Licence this organization has been producing the DPT group of vaccines viz., DPT, DT and TT vaccines as its main product, as well as Fissue Culture Anti Rabies Vaccine (TCARV). No production work carried out during the suspension period. On receipt of the revocation order, this Institute concentrates to produce and supply of DPT group of vaccines and TCARV in the existing facilities with due modification as well as creation of newer cGMP infrastructure for vaccine production.

### A. BACTERIAL VACCINE DIVISION

The bacterial vaccine division comprises of three basic functional units, which has been producing bulks for the production of DTP group of vaccines.

- Diphtheria
- Tetanus
- Pertussis

The DTP vaccine production units have adopted modern fermentor technology to produce the toxin (Tetanus and Diphtheria) and bacterial mass (B. pertussis), which are the components of DTP group of vaccines. **PIIC is the first Institute in the country both in public and private sectors to adopt and install the PROSTAK system for clarification of toxin and concentration of formal treated toxin prior to ammonium sulfate fractionation step and concentration of Pertussis organisms.** The crude toxoid of both tetanus and diphtheria are purified as per GMP norms adopting latest technology of Tangential flow principles using appropriate membrane and cassettes (Micro filtration & ultra filtration). Further the Membrane filters successfully replaced the old fiber shedding EKS filters in the final polishing filtration process.

### DIPHThERIA

This section is adopting fermentation technology for the cultivation of Diphtheria organisms. The capacity of the fermentor is 400 lts. The crude toxoid of diphtheria is purified as per adopting latest technology of Tangential flow principles using appropriate membrane and cassettes (Micro filtration & ultra filtration). Membrane filters were successfully replaced the old fiber shedding EKS filters.

During the reporting period, 8 million doses of Bulk Purified Diphtheria Toxoid (BPDT) has been produced.





**d. EXPERIMENTAL ANIMAL HOUSE**

Production Labs and Quality Control Department conducted in vivo tests in the experimental animal house. These experimental animals were maintained in the Experimental animal house during the test period as per test procedure.

**LABORATORY ANIMAL DIVISION**

Number of animals supplied to internal users:

Mice : 11928 Nos.  
Guinea Pig : 1038 Nos.

Number of animals supplied to other Institutes:

Mice : 900 Nos.

**GEL & MIXING SECTION**

During the period 3 batches of Aluminium Phosphate Gel were prepared. This is enough to prepare approximately 6 million doses. 12 final bulks were formulated (apprx. 6.00 million doses).

**DPT CONTAINERIZATION, LABELLING & PACKING SECTION**

During the period 28 lots of DPT vaccine filled and processed.

**DPT VACCINE SUPPLY TO UIP**

We have completed the supply of 100.00 lakh doses of DPT vaccine as per the Supply Order issued. In addition to the allotted quantity, an additional quantity of 6.70 lakh doses was supplied to the Universal Immunization Programme. Thus a total of 106.70 lakh doses of DPT vaccine was supplied to UIP.

**RABIES TREATMENT CENTRE & DISPENSARY**

Rabies treatment center established in 1907 for treatment of dog bite cases is continuously functioning for the last 100 years or more effectively and efficiently. For the benefit of the long distance patients coming from far of places this hospital is working round the clock. During day time the dispensary is also providing basic health care facilities to employees of Pasteur Institute of India and their dependents. Rabies treatment center is also engaged in collecting epidemiological data of animal bite cases and also efficacy of antirabies vaccines. In order to minimize the cost and quantity of tissue culture vaccine intra dermal administration is practiced.

**DISPENSARY PERFORMANCE STATISTICS**

Staff and family : 6293  
Diabetes patients : 60  
Hypertensive patients : 75  
Asthma patients : 5

**PATIENTS TREATED WITH TCARV**

Sl. No.	Details	Nilgiris	Other than Nilgiris	Total cases	In percentage (%)
1.	Class - I	16	39	55	3
2.	Class - II	89	33	122	8
3.	Class - III	486	961	1447	89
4.	A.R.S.	337	694	1031	71
5.	Adult Male	282	559	841	71
6.	Adult Female	150	256	406	25
7.	Child Male	96	147	243	15
8.	Child Female	63	71	134	15
	<b>TOTAL</b>	<b>591</b>	<b>1033</b>	<b>1624</b>	<b>8</b>
	<b>Hydrophobia</b>	<b>Nil</b>	<b>5</b>	<b>5</b>	

**COST WISE DETAILS**

Total cost of TCARV sold (1698 doses) worth Rs. 1,99,830.00  
Antirabies serum sold (6532 vials + 0.2 ml) Rs. 5,48,691.00  
**Total** Rs. 7,48,521.00

**QUALITY ASSURANCE**

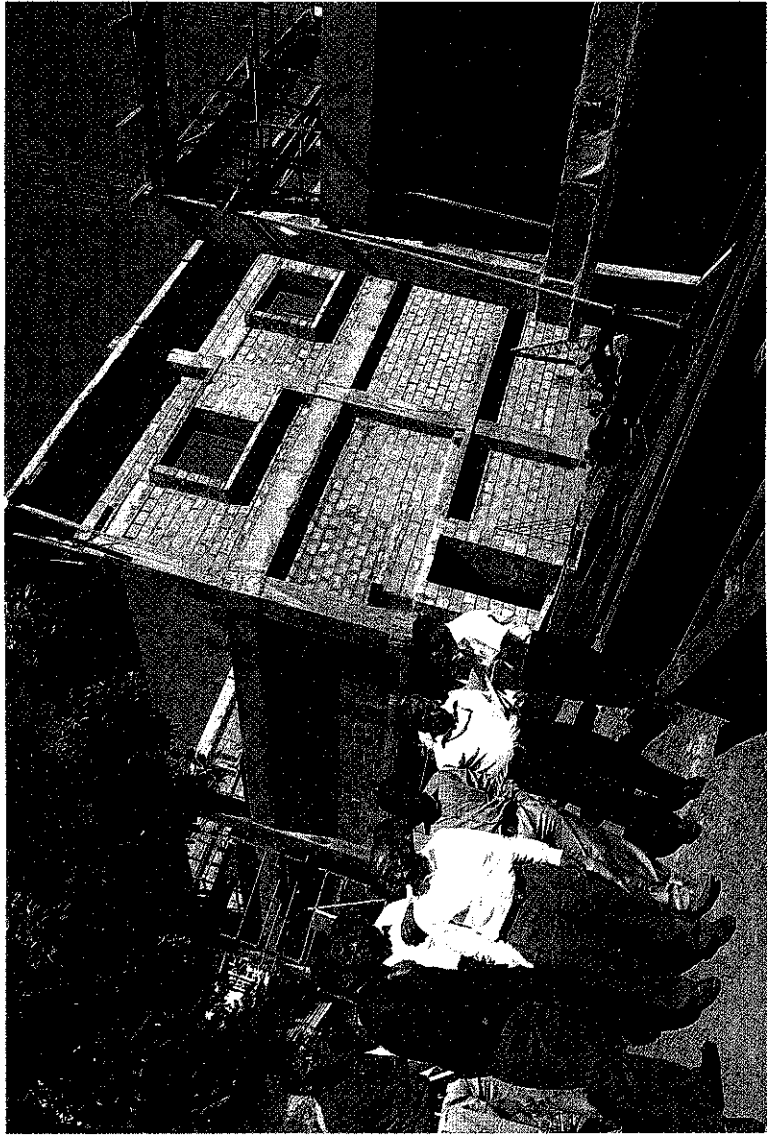
“Quality Assurance” is a wide – ranging concept covering all matters that individually or collectively influence the quality of a product. It is the totality of the arrangements made with the object of ensuring that pharmaceutical products are of the quality required for their intended use. Quality Assurance therefore incorporated GMP and other factors.



photo  
gallery

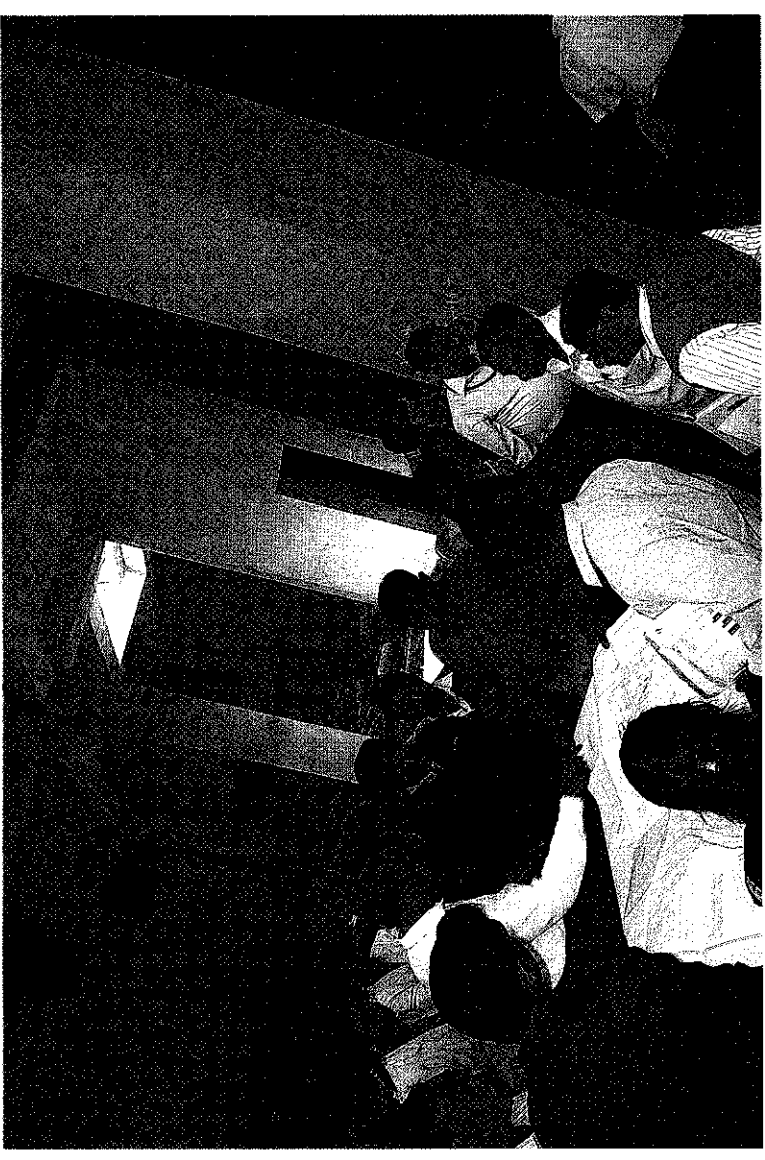


Local Monitoring Committee to assess the progress of  
CGMP Activities held on 21 - 08 - 2015

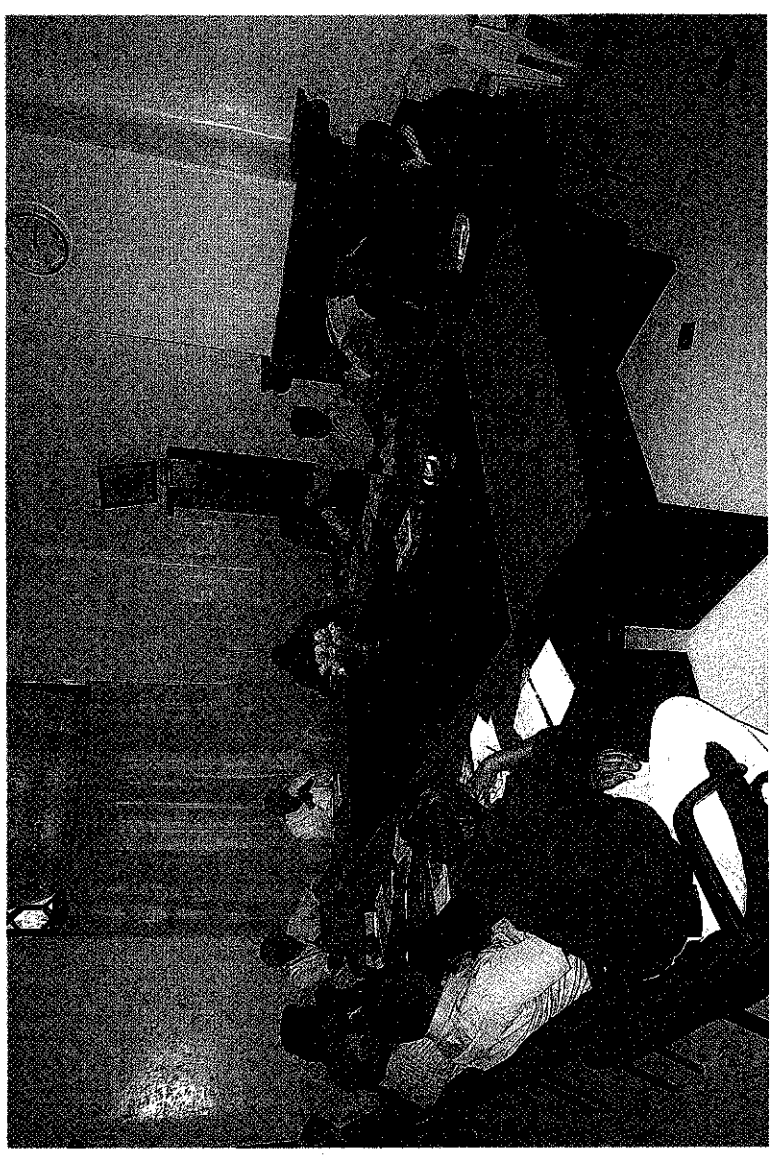


Local Monitoring Committee to assess the progress of  
cGMP Activities held on 21 - 08 - 2015

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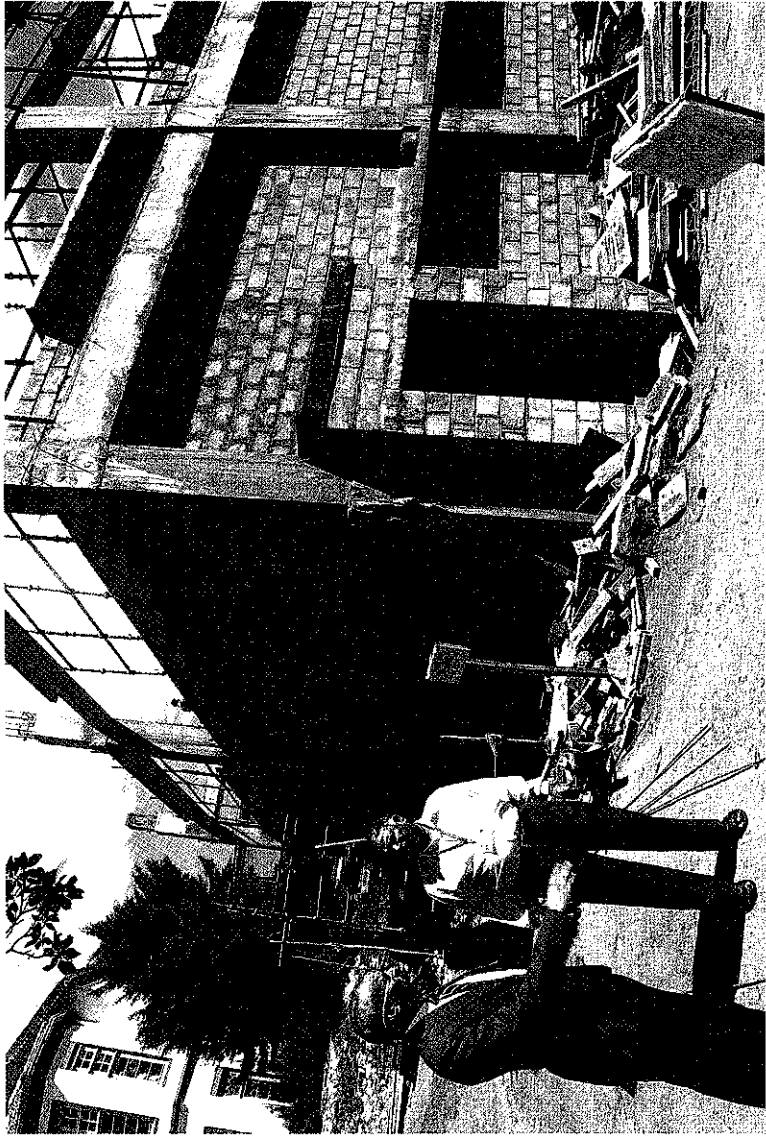


Local Monitoring Committee to assess the progress of  
CGMP Activities held on 21 - 08 - 2015



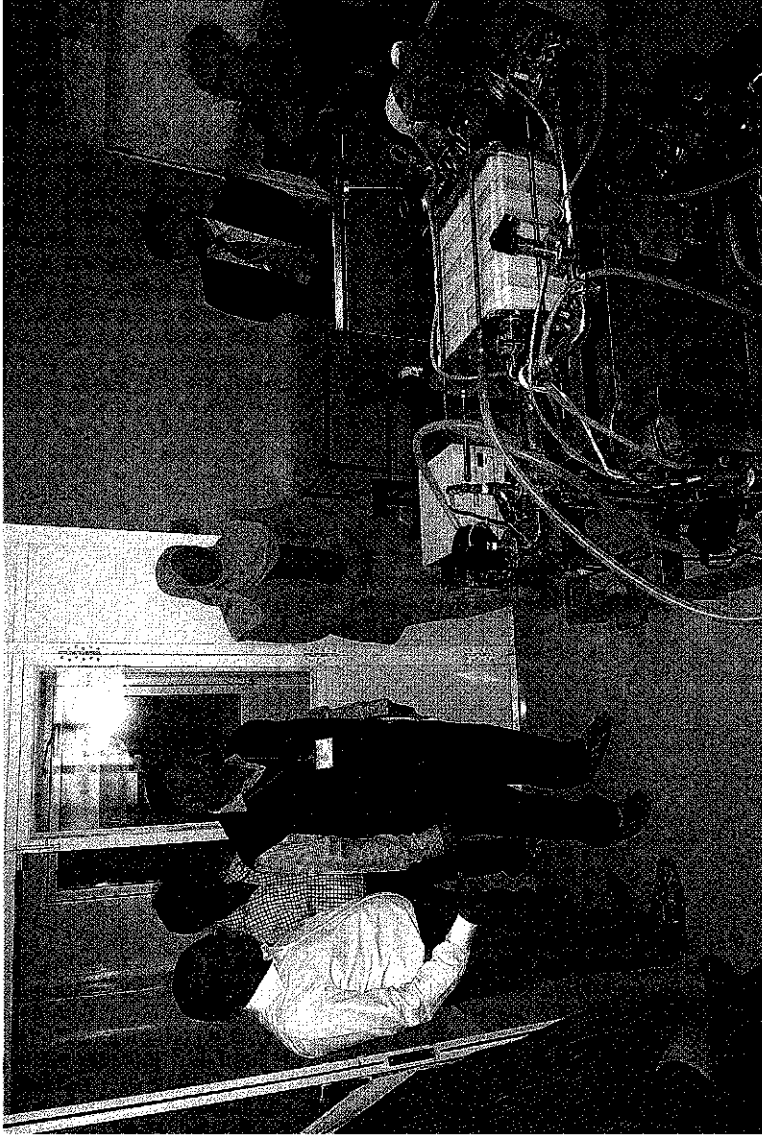
Followup Meeting on declaring Nilgiris as Rabies Free District

photo  
gallery



Visit of Shri R. P. Meena, Director (RCH), MoH & FW, New Delhi  
with Dr. B. Sundaran, Asst. Director

photo  
gallery



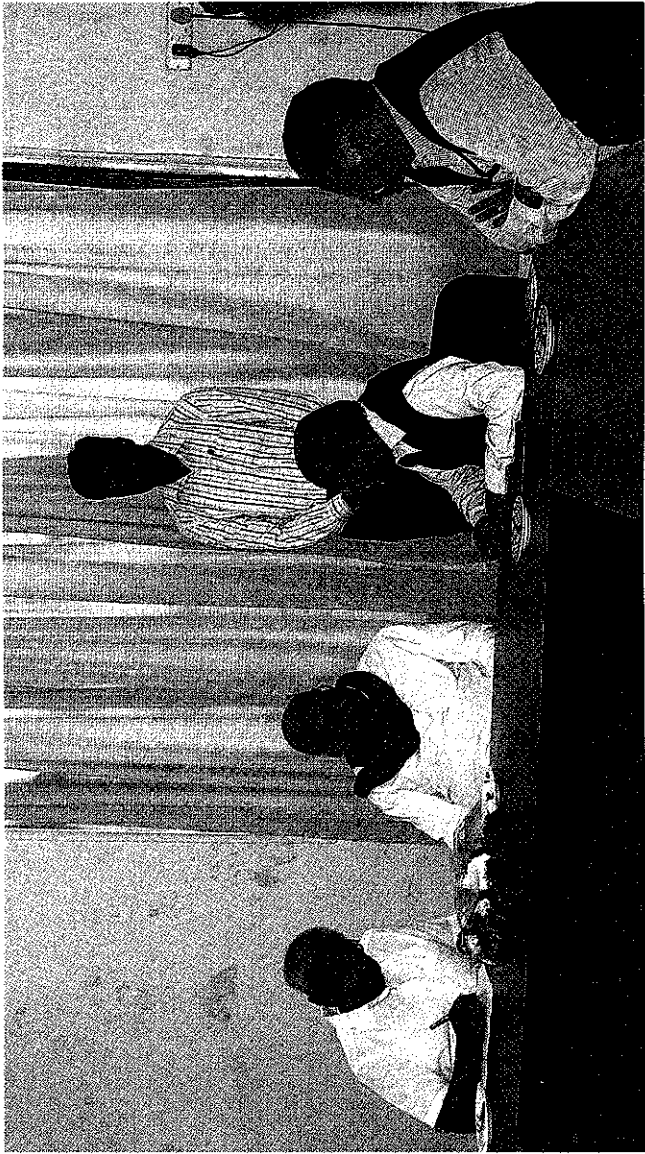
Visit of WHO Team to explore the possibility  
of manufacturing sIPV at the Institute on 22-01-2015



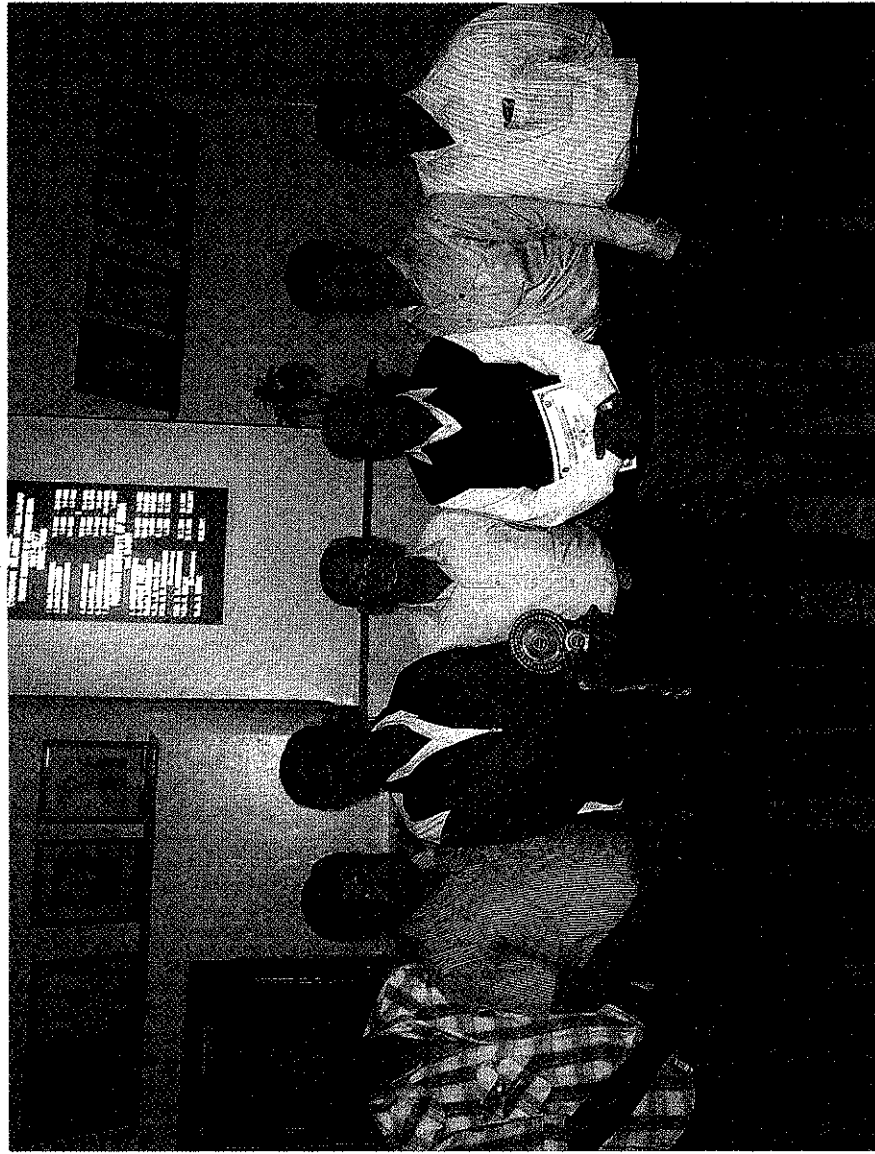
Hindi Diwas held at this Institute on 25 - 09 - 2014



photo gallery

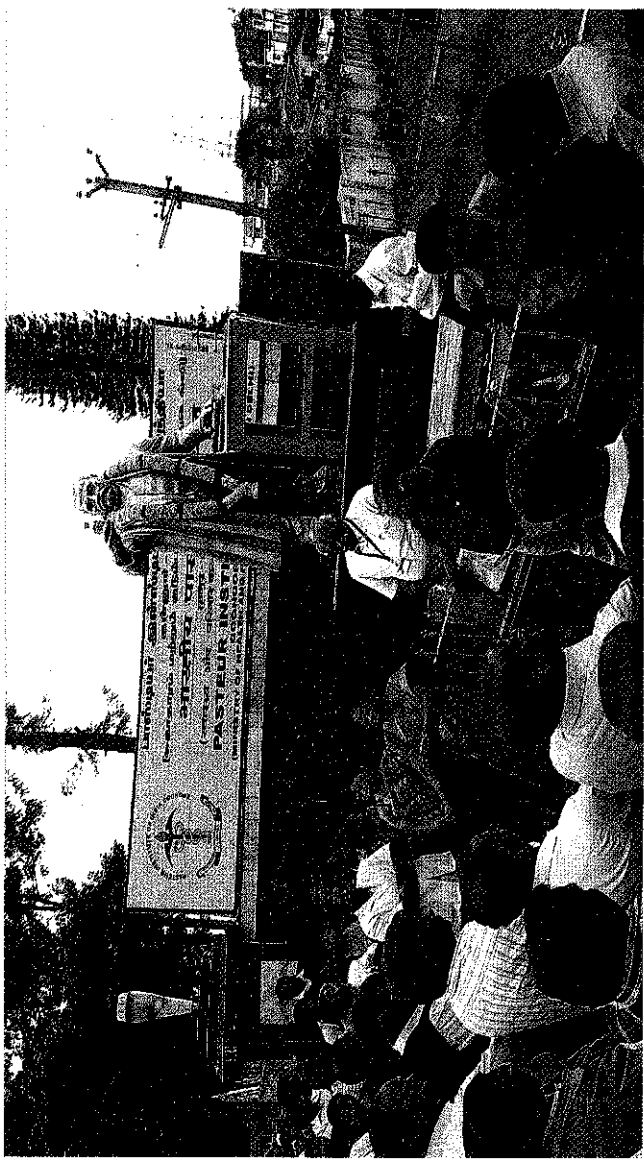


Visit of Shri T. K. Rangarajan, M. P. to this Institute on 23-01-2015



Chief Ministers Ball Badminton Trophy  
(from left : Winners - Shri R. Saravanan, Shri B. N. Haldurai, Shri R. Srinivasan,  
Dr. B. Sekar, Shri J. Joseph, Shri A. K. Jithendran and Shri A. Vairamoorthy)

photo gallery



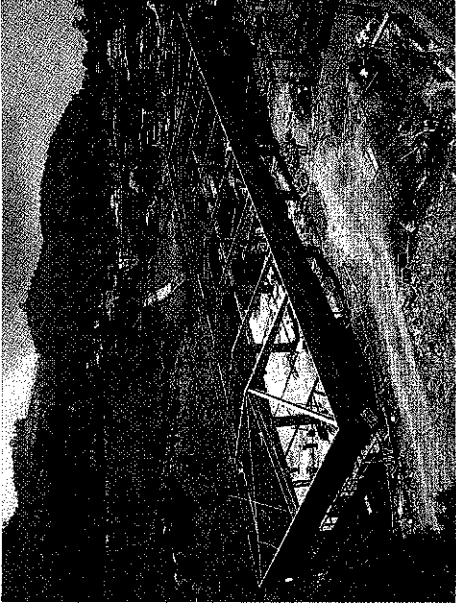
World Rabies Day - Garlanding of Louis Pasteur Statue on 28-11-2014



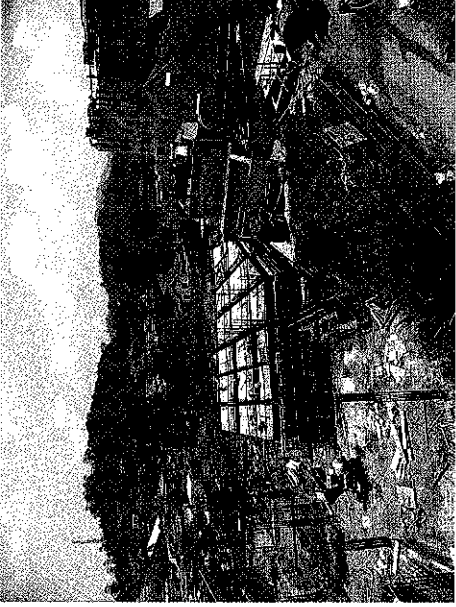
Swachh Bharat Mission - 02-10-2014

**Progress on cGMP construction**

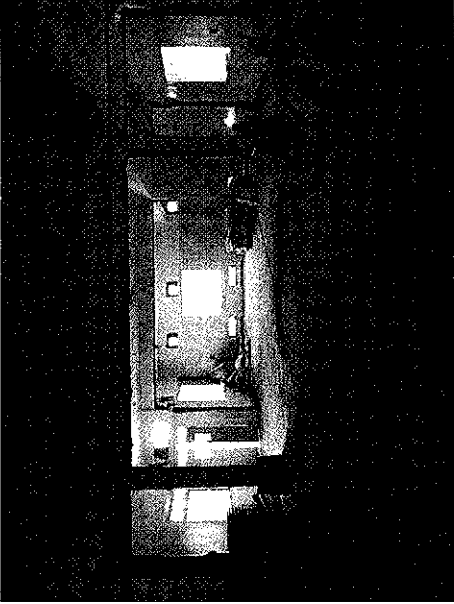
**D & P Block**



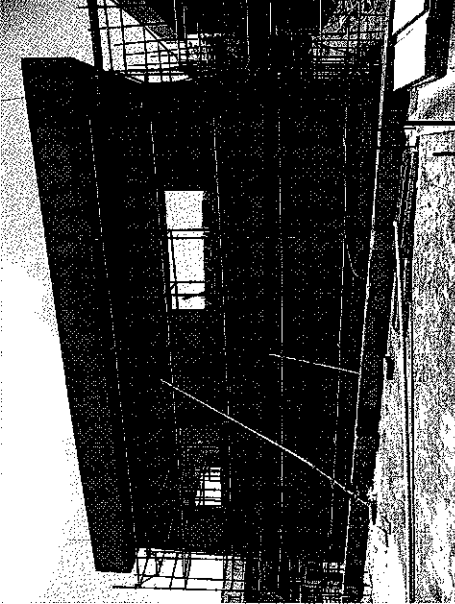
**Formulation Block**



**Animal Breeding Modification**



**Microbiology Block**



**Animal Exp. Block**



THE NEW INDIAN EXPRESS  
COIMBATORE TUESDAY 16 DECEMBER 2014

### Contest for Students on Rabies Awareness

**Express News Service** Coonoor: Pasteur Institute of India Coonoor (PIC) an autonomous institution under Union Health Ministry, conducted an essay writing contest on the topic 'Role of Vaccine in Human Health: Pet Animal'. Students of 33 schools in Nilgiris participated.

In the essay-writing contest, I. Shrivani (Kendriya Vidyalaya, Wellington) won first prize of ₹4000. V. Chandrayam (Govt HSS, Neduvila) second prize of ₹3000, R. Suganthini (Govt High School, Kattabettu) third prize of ₹2500 and B. Rohani (Govt High School, Kattabettu) fourth prize of ₹1000.

In drawing contest, D. Kushi (JSS International School, Ooty) won first prize of ₹3000, P. Galarasan, (JSS International School, Ooty) second prize of ₹2000, M. Kousalya (St Ann's Girls HSS, Aruvankadu) third prize of ₹1500 and D. Nithyasree (Govt HSS, Kili Kotagiri) fourth prize of ₹1000.

"Our attempt is to sensitize students on creating a rabies-free Nilgiris," PIC Director Dr B Sekar told Express on Monday.

18 • glimser • Coonoor 18.12.2014

**உள்ளூர் குழுவின் வெற்றி**  
**கல். குடிரன் புகழ் தீவிரம்**

கொடகாட்டில் உள்ள கல். குடிரன் புகழ் தீவிரம் குழுவினரின் தலைமையில் உள்ளூர் குழுவினர் கல். குடிரன் புகழ் தீவிரம் குழுவின் வெற்றி குறித்து செய்தி வெளியிட்டது. குழுவினர் கல். குடிரன் புகழ் தீவிரம் குழுவின் வெற்றி குறித்து செய்தி வெளியிட்டது. குழுவினர் கல். குடிரன் புகழ் தீவிரம் குழுவின் வெற்றி குறித்து செய்தி வெளியிட்டது.

**List of Indian Journals Purchased:**

1. MIMS.
2. Antiseptic
3. Chemical Product Finder
4. CIMS
5. Herald of Health
6. Indian Journal of Biotechnology
7. Indian Practitioner
8. Pharma Review
9. Tamil Computer

**WHO Publication (Periodicals and Selected series)**

1. Bulletin of the World Health Organization
2. Pharmaceuticals and Biologicals
3. Weekly Epidemiological Record
4. WHO Technical Report series

**Details regarding Amount Spent:**

Amount spent on purchase of books (01-04-2014 to 31-03-2016) : Rs. 11,090.00

Amount spent on renewal of foreign and Indian journals : Rs. 8,63,602.00

Amount spent on renewal of WHO publications : Rs. 46,178.00

**Academic Activities:**

In addition to the usual library activities the industrial visit from different colleges and universities were entertained to the students to enrich their scientific knowledge and to create awareness in vaccine production and immunization procedures etc. From April 2014 to March 2015, 89 batches of students have visited the Institute.

During the period April 2014 to March 2015, 31 students for project, 106 students for in plant training were enrolled.

The library is having internet connection to utilize the E-Journal service to the maximum. Project certificates and attendance certificates were typed and made all the arrangements to issue the same to the students through library.

*To strive to seek to find and not to yield*



### DETAILS OF THE PROMOTION MADE DURING APRIL 2014 TO MARCH 2015

Sl No.	Name	Designation	Promoted to	Date
1.	Shri M. Gopal	Sr. Technical Assistant	Asstt. Technical Officer	13.08.2014
2.	Shri D. Chandran	Technical Assistant	Sr. Technical Assistant	13.08.2014
3.	Shri N.M. Ramakrishnan	Laboratory Technician	Technical Assistant	13.08.2014
4.	Shri P. Vasu	Laboratory Assistant	Laboratory Technician	13.08.2014
5.	Shri R. Gunasekaran	Multi Tasking Staff	Laboratory Assistant	13.08.2014
6.	Shri K. Arumugam	Multi Tasking Staff	Laboratory Assistant	13.08.2014
7.	Shri R. Dharmalingam	Upper Division Clerk	Head Clerk	01.12.2014
8.	Shri P. Pannarselvam	Laboratory Assistant	Laboratory Technician	01.01.2015
9.	Shri P. Periyasamy	Multi Tasking Staff	Laboratory Assistant	01.01.2015

### DETAILS OF THE STAFF SUPERANNUATED/OPTED VRS DURING THE PERIOD FROM APRIL 2014 TO MARCH 2015

Sl No.	Name	Designation	Date
1.	Shri S. Ragunathan	Duffadar	31.08.2014
2.	Shri A. Louis	Upper Division Clerk	30.11.2014
3.	Shri R. Rajeswari	Head Clerk	30.11.2014
4.	Shri S. Chandrasekaran	Laboratory Technician	31.12.2014

### OTHER ACTIVITIES DURING THE PERIOD

#### WORLD RABIES DAY:

An inter school quiz competition on 'Vaccine and Human Health' was held on 6<sup>th</sup> December, 2014 at 11.00 a.m. at the Breeks Memorial Anglo Indian Higher Secondary School Auditorium, Ooty. About 62 schools in Nilgiris District, both private and government schools, were invited for the quiz competition among which 11 teams from different schools have participated. The quiz competition was inaugurated by Dr. (Mrs) Bhanumathy, Deputy Director of Health Services Ooty, Mr. K. Alexander Barnabas, Headmaster, Breeks Memorial Anglo Indian Higher Secondary School, Ooty, Mr. Ashwini Kumar, Chief Manager, Bank of Baroda, Dr. B. Sekar, Director, Pasteur Institute of India, Coonoor welcomed all the gatherings.

Initially pre-qualifying round for 11 teams was held and 6 teams of 2 students each have been selected for the main quiz competition. The main aim of the quiz competition was to create awareness on diseases that can be prevented by vaccination among school children and to the general public through them.

I - Prize was awarded to Ms. K.M. Viveka and Mr. Adrian Ernest Gilby of Wood Side School, Ooty.



II - Prize was awarded to Ms. K. Harrini and Ms. S. Rony Shiela of Cordite Factory School, Aruvankadu.

III - Prize was awarded to Ms. Shahanaz and Mr. M. Tejas of St. Stanes A.I. Higher Secondary School, Coonoor.

IV - Prize was awarded to Ms. N. Ani and Mr. C. Santhosh of Hindu Vidhalaya, Coonoor.

The winners were awarded cash prize of Rs.3000/- each for first place, Rs.2500/- each for second place, Rs.2000/- each for third place and Rs.1000/- each for fourth place along with a shield and certificate.

The cash prizes were sponsored by Bank of Baroda and were distributed by Shri Ashwini Kumar, Chief Manager of Bank of Baroda, Coonoor. The certificates were distributed by the Headmaster, Breeks Memorial Anglo Indian Higher Secondary School to the winners and to all the other participants too. All the winners were awarded shield from Pasteur Institute of India, Coonoor.

The audience were the students of the Breeks Memorial Anglo Indian Higher Secondary School, Ooty and open questions were also addressed to the audience and those who answered correctly were awarded. The quiz masters were Dr. (Mrs) Jeeva Kalaiselvan, Sr. Research Officer and Dr. S. Jagannathan, Assistant Research Officer of the Institute. The programme was co-ordinated by Dr. B. Sekar, Director of Pasteur Institute of India, Coonoor.

Prior to the quiz competition, Pasteur Institute of India, Coonoor has also conducted Essay Writing Competition on "Role of Vaccine in Human Health" and Drawing Competition on 'Me and my Pet Animal' among the school students of Nilgiris District on 2-12-2014. 30 candidates for Essay Writing Competition and 36 candidates for Drawing Competition have participated from 33 schools.

Ms. I. Shivani, KV, Wellington won I prize of Rs.4000/-, Mr. V. Chandrothyam, Govt. Hr. Sec. School, Nedugula won II prize of Rs.3000/-, Ms. R. Suganthi, Govt. High School, Kattabettu won III prize of Rs.2500/-, and Mr. B. Rohani, Govt. High School, Kattabettu won IV prize of Rs.1000/- for Essay Writing Competition and

Ms.D. Kushi, J.S.S. International School, Ooty won I price of Rs.3000/-, Mr. Pugalarasan, J.S.S. International School, Ooty have won II price of Rs.2000/-, Ms. M. Kousalya, St. Ann's Girls Hr. Sec. School, Aruvankadu have won III price of Rs.1500/-, and Ms. D. Nithyasree, Govt. Hr. Sec. School, Kil Kotagiri have won IV price of Rs.1000/- for Drawing Competition.

All the winners were also awarded with a Certificate and Shield from Pasteur Institute of India, Coonoor. Certificates were also distributed to all the participants of the above programmes.

On the whole the three competitions held in commemoration of World Rabies Day by Pasteur Institute of India, Coonoor enriched the students with sound educational information on the importance of the vaccine and the disease that can be prevented by vaccination.



**VISIT OF WHO TEAM TO EXPLORE THE POSSIBILITIES OF MANUFACTURING sIPV AT THIS INSTITUTE**

The following team have visited this Institute on 22-01-2015 to explore the possibilities of manufacturing sIPV at this Institute -

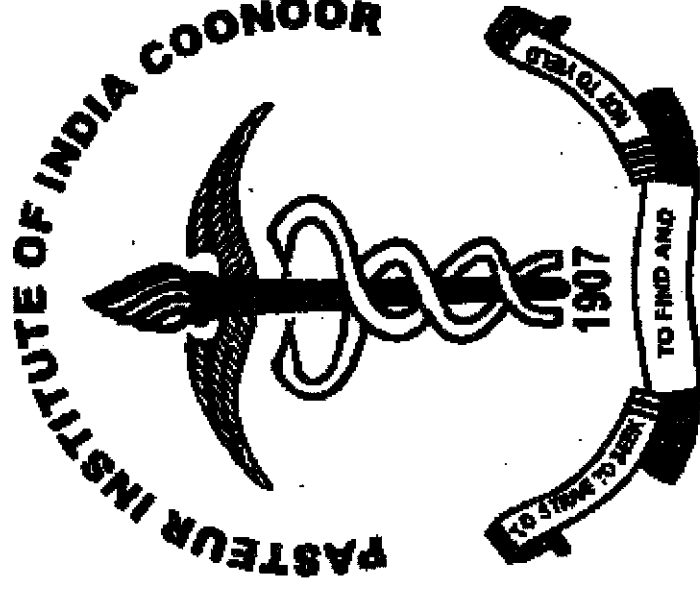
1. Jadic Fournier Caruana, Scientist, Prequalification Team, WHO
2. Dr. Hiro Okayasn, WHO
3. Dr. Ahd Ahmidi, Intravacc, Netherlands
4. Dr. Wilfred Bakker, Intravacc, Netherlands

**SWACHH BHARAT MISSION**

As per the Government of India instruction, Swachh Bharat Mission observed on 2nd October 2014 onwards. All the Officers and Staff Members took part in this mission.

**CONCLUSION**

The civil construction and other related engineering tasks have been undertaken for our new GMP project. Concurrently DPT vaccine production in existing facility was continued and we supplied 106.70 lakh doses of DPT vaccine to the UIP in the reporting year. Rabies treatment and Rabies Diagnostic activities have been continued. Academic activities in the form of Industrial visit, short term training and PG students project work were undertaken. The whole team of this Institute is committed to work towards the objective and policies of this Institute.



**SCIENTIFIC REPORT**

2014 - 15



**PAPER PRESENTED IN 16TH NATIONAL CONFERENCE OF THE ASSOCIATION FOR PRODUCTION AND CONTROL OF RABIES IN INDIA HELD ON 5TH & 6TH JULY, 2014 AT MYSORE**

**ROLE OF PASTEUR INSTITUTE OF INDIA, COONNOOR IN THE PROPHYLAXIS AGAINST RABIES: AN OVERVIEW**

**Dr. (Mrs.) Sibani Barman\***, Senior Medical Officer, Dr. K.N. Venkataramana, Assistant Director, Dr.B. Sekar, Director.

**ABSTRACT:**

Pasteur Institute of India, Coonnoor (PIIC) was started in 1907 with the objective of Production and Supply of Anti Rabies Vaccine to the Nation. Concurrently, prophylactic treatment for Rabies had been started on 7<sup>th</sup> April 1907 in this Institute, for Animal bite Victims from all over Tamilnadu (TN) and also from the neighboring States. This presentation is an analysis of the data available with the Anti Rabies clinic of PIIC over a period of 31 years (1984-2014). In PIIC from the year 1907 to 2004, Neural Tissue Anti Rabies Vaccine was used. Since 2001 Tissue Culture Anti Rabies Vaccine is being used. We administer ERIG to the needy cases. During the last 21 years 71043 animal bite victims have taken prophylactic treatment at PIIC OPD. Over the years it is observed that there is drastic reduction in incidence of animal bites from 6678 cases in the year of 1993 to 1811 cases in the year 2014. Over the 31 years period cases of suspected rabies reported from Nilgiris districts were only 24 Nos. From other districts of TN 559 cases were reported. Since 1999-2012 no case was reported but in the year 2013, 1 case and in the year 2014, 2 cases were reported from Nilgiris district for which source of animal bite is uncertain. In the year 2014, 5 cases were reported from other district of Tamil Nadu. Incidence of animal bite cases and suspected rabies cases reported at PIIC OPD are reduced in number. 67.3% of cases reported to our dispensary are Class-III category exposure out of that in 59% cases given A.R.S. (ERIG). Since in PHCs and other hospitals in Tamil Nadu do not stock RIG is not available we are receiving more patients in need of RIG in our OPD. PIIC is offering 24 hours service for animal bite victims. Both NGO's and government agencies in Nilgiris are contributing to the control of animal rabies by ABC and mass immunization of stray dog. Prevention is better than cure, so IDRV and RIG should be available in all ARC at Govt. and NGO.

*To strive to seek to find and not to yield*

**STUDENT PROJECT CONDUCTED AT THIS INSTITUTE**

**Study on the effect of purified Diphtheria Toxin & Toxoid in Animal Model**

P. Silambarasan, Aradhana Philip, S. Suganya, M. Hemalatha  
Supervisor: Mrs. Shanthi Mami & Dr. (Mrs.) Jeeva Kalaiselvan

**ABSTRACT**

Diphtheria is a life threatening disease that is entirely preventable by vaccination. Diphtheria Toxoid is prepared from the exotoxin, Diphtheria Toxin (DTx). The toxin is converted by formaldehyde into a nontoxic but still immunogenic diphtheria toxoid. The quality of Diphtheria toxoid depends mainly on the detoxification process, formaldehyde concentration, presence of matrix, reaction time and temperature. This study is with the aim of producing a safe and potent diphtheria toxin. Purification of Diphtheria toxin by concentration method i.e. by Ultrafiltration before the detoxification with formaldehyde and optimization of detoxification process for the conversion of purified toxin to toxoid with increasing formaldehyde concentrations resulting in toxoid products varying in residual toxicity, in the presence of artificial matrix (Glycine) and purification by dialysis followed by investigating the applicability of physicochemical (SDS PAGE) and Animal model (Guinea pig) to predict the effect of detoxifying agent on the experimental diphtheria toxins.

**Studies on Comparative Analysis of Rabies Virus Infectivity titre in Murine Neuroblastoma -2A and BHK cell lines**

S. Prabhakaran, T. Akileshwar, P. Rashmi, P. Manikandan  
Supervisors: Shri C. Palaniappan and Dr. N. Sivananda

**ABSTRACT**

Rabies virus infectivity titre was quantified in Neuroblastoma-2A and BHK-21 cell lines by infectivity titre estimation using Spearman and Karber method of calculation. In both the cases the same virus titre was obtained and it was concluded that the Neuroblastoma-2A and BHK-21 cell lines can be used for the Rabies Virus titration.

*To strive to seek to find and not to yield*

**Purification and Biochemical characterization of Pertussis Toxin (PT) from Bordetella pertussis strain 509**

G. Muniraj, Angel K. Thangachen, S. Kamalakannan, S. Shanmugapriyanka  
Supervisors: Dr. K.C. Shivanandappa, Dr (Mrs) Jeeva Kalaiselvan

**ABSTRACT**

Pertussis vaccine has been used for nearly 90 years worldwide for the Universal Immunization of children to prevent and control whooping cough disease in combination with Diphtheria and Tetanus (DPT vaccine). In the meantime some of the biological reactions in the immunized children of the pertussis vaccine were observed. Therefore, during 1984 purified acellular pertussis vaccine for developed in Japan using purified pertussis toxin and FHA had a major vaccine component was shown that there was no reactions preparation had developed considerably owing to increasing knowledge of immunobiological property, antigenic pattern and chemical composition of B. pertussis and extensive immunoepidemiological experience. Pertussis Toxin (PT) is a major toxin component of Pertussis organism which plays major role of immunogenicity in the final pertussis vaccine. Therefore, in this project study we have purified pertussis toxin component





produced by vaccine strain 134 using Size exclusion and Affinity chromatography and the protein was analysed by SDS-PAGE analysis. Further the purified samples were also subjected to in-vitro and in-vivo studies for the characterization of the Pertussis Toxin. From this project study it was concluded that PT is one of the virulence factors, and the seroconversion rate is also higher. Also it can be used for diagnostic purpose. And also these findings are more interesting and helpful for further investigation like immunological studies of B. pertussis. This is preliminary approach to the development of chimeric protein vaccine against B. pertussis.

#### **Purification, Characterization of Filamentous Haemagglutinin (FHA) from Bordetella pertussis strain 134 as a vaccine component for whooping cough disease**

M. Gowsalya, C. Vishalini

Supervisors : Dr. K.C. Shivanandappa, Dr (Mrs) Jeeva Kalaiselvan

Filamentous Haemagglutinin (FHA) is a major virulence component of Pertussis organism which play a major role of immunogenicity in the final pertussis vaccine. Therefore, in this project study we have purified Filamentous Haemagglutinin component from strain 134 employed size exclusion and affinity chromatography, the protein was analysed by SDS-PAGE analysis. Further the purified FHA was also subjected to in vivo studies such as LPF, HSF, Mouse Foot pad tests for the confirmation of FHA activity. The purified FHA sample was also used for the antiserum preparation in laboratory guinea pig. The immune response in guinea pig analysed by the method of Rocket Immunoelectrophoresis. Injected animals showed higher immune response, by the antibody movements towards opposite charge. From this project study it was concluded that FHA is one of the virulence factors which has a potential role in development of new and safer pertussis vaccine.

Purification, Characterization of Pertussis Toxin (PT) from Bordetella pertussis strain 134 as a vaccine component for whooping cough disease

#### **Comparative Analysis of yield and recovery of Rabies Viral protein for the production of Tissue Culture derived Rabies Vaccine for Human Use (G-25 Matrix)**

Bibin Stephen Devassia, Anjitha V. Cherian

Supervisor: Dr. A. Premkumar & Dr. K. N. Venkataramana

#### **ABSTRACT**

During the vero cell based rabies vaccine processing the residual impurities like Residual serum protein and host cellular DNA was removed by the cellulose sulfate chromatography using with increasing concentration of NaCl. The higher NaCl concentration was subsequently removed by the ultrafiltration mode and during that processing the loss of protein was observed. To overcome the problems the size exclusion chromatography G 25 experiments was conducted along with NaCl standard concentration. The NaCl presence was analysed and quantified by the Silver nitrate precipitation and conductivity methods. During this project study elimination of NaCl level was lower but significant losses of protein was also observed when this was compared with indigenous sucrose sprinkling desalting and concentration method, the protein loss was very less but in same time the NaCl elimination was higher. In case of immune response analysis the SSP method desalted and concentrated materials was showing higher immune response when compared with others.



#### **Comparative Analysis of yield and recovery of Rabies Viral protein for the production of Tissue Culture derived Rabies Vaccine for Human Use (G-50 Matrix)**

G. Priyanka, S. Revathi

Supervisor: Dr. S. Jagannathan & Dr. K. N. Venkataramana

#### **ABSTRACT**

During the vero cell based rabies vaccine processing the residual impurities like Residual serum protein and host cellular DNA was removed by the cellulose sulfate chromatography using with increasing concentration of NaCl, the higher NaCl concentration was subsequently removed by the ultrafiltration mode, while that processing the loss of protein was observed, to overcome the size exclusion chromatography G 50 experiments was conducted along with NaCl standard concentration. The NaCl presence was analysed and quantified by the Silver nitrate precipitation and conductivity methods. During this project study elimination of NaCl level was lower but significant losses of protein was also observed when this was compared with indigenous sucrose sprinkling desalting and concentration method, the protein loss was very less but in same time the NaCl elimination was higher. In case of immune response analysis the SSP method desalted and concentrated materials was showing higher immune response when compare with others.

#### **Bioinformatics studies on the determination of antigenic sites and epitopes of Rabies virus glycoprotein for the designing and development of specific Anti-rabies epitope vaccine**

Selvin Christopher

Supervisor: Dr. A. Premkumar & Dr. K. N. Venkataramana

#### **ABSTRACT**

Rabies is an acute progressive viral encephalomyelitis with the highest case fatality rate (nearly 100%) among conventional infectious disease. The disease is caused by single-stranded negative sense RNA viruses from the genus Lyssavirus that circulate in mammals. The genome of rabies virus encodes five proteins: the nucleoprotein, phosphoprotein, matrix protein, glycoprotein and the RNA dependent RNA polymerase. Glycoprotein is most important protein as it is the only outer membrane protein exposed to the cell surface of Rabies virus. The Rabies virus G forms a homo-trimer structure projection form the surface of the virion. As the only outer protein of the virus, the Rabies virus G has a pivotal role in virion attachment to host cell receptors, and is a crucial component in the development of immune responses against Rabies virus. With the development in Bioinformatics, epitope vaccines have become more important in immune prevention. The identification and characterization of antigenic epitopes play an important role in vaccine designing, immunodiagnostic tests, and antibody production. As identifying epitope experimentally time-consuming and expensive, computational methods for reliably and efficiently predicting B-cell epitopes are highly desirable. S here, in our study we used different computational and biological software's for predicting the antigenic epitopes in Rabies Glycoprotein and further peptide protein docking was done using different docking tools. The results revealed the dominant epitopes of Rabies glycoprotein and will give experimental data for the designing of vaccines against Rabies disease.



### Bioinformatics studies on the determination of antigenic sites and epitopes of Rabies virus matrix protein for the designing and development of specific Anti-rabies epitope vaccine

Minni Sharon

Supervisor: Dr. A. Premkumar & Dr. K. N. Venkataramana

#### ABSTRACT

Rabies is one of the oldest recognized and most important zoonotic diseases of India and worldwide, affecting man and animals. It is caused by rabies virus (RV), it has five main proteins, Glycoprotein, Nucleoprotein, Matrix protein, Phospho protein, the Polymerase L protein. Nucleoprotein is one of the important biomolecule to express antigenic properties to choose antigenic peptide. When virus enters through cell membrane antigenic nucleoprotein start to produce antibody with the help of receptor protein. Epitopes comprise the fundamental structural subunits of T and B cell antigen receptors (TCR and BCR, respectively) and the specific antibody binding sites. A major challenge in the development of epitope-based vaccines is to establish the immunogenic sites of the antigen that exhibit the greatest efficiency. In the present study, we used computational molecular biology software to predict structural properties of antigenic protein and T and B cell epitopes of antigenic protein. The results revealed the dominant epitopes of Rabies Glycoprotein and will give experimental data for the designing of vaccines against Rabies diseases.

### Bioinformatics studies on the determination of antigenic sites and epitopes of Rabies virus nucleoprotein for the designing and development of specific Anti-rabies epitope vaccine

Nisha Mathew

Supervisor: Dr. A. Premkumar & Dr. K. N. Venkataramana

#### ABSTRACT

Rabies is one of the oldest recognized and most important zoonotic diseases of India and worldwide, affecting man and animals. It is caused by rabies virus (RV), it has five main proteins, Glycoprotein, Nucleoprotein, Matrix protein, Phospho protein, the Polymerase L protein. Nucleoprotein is one of the important biomolecule to express antigenic properties to choose antigenic peptide. When virus enters through cell membrane antigenic nucleoprotein start to produce antibody with the help of receptor protein. Epitopes comprise the fundamental structural subunits of T and B cell antigen receptors (TCR and BCR, respectively) and the specific antibody binding sites. A major challenge in the development of epitope-based vaccines is to establish the immunogenic sites of the antigen that exhibit the greatest efficiency. In the present study, we used computational molecular biology software to predict structural properties of antigenic protein and T and B cell epitopes of antigenic protein. The results revealed the dominant epitopes of Rabies Glycoprotein and will give experimental data for the designing of vaccines against Rabies diseases.

### RESEARCH ARTICLES PUBLICATION IN JOURNALS OTHER PROJECTS CARRIED OUT IN THE REPORTING PERIOD

#### STUDY ON THE EFFECT OF PURIFIED DIPHTHERIA TOXIN & TOXOID IN ANIMAL MODEL

#### STUDY ON QUALITY CONTROL TESTING AND COMPARATIVE QUANTIFICATION OF PROTEIN CONTENT OF DIPHTHERIA AND TETANUS TOXOID ESTIMATION BY KJELDHAL METHOD AND LOWRY'S METHOD

Dr N Sivananda<sup>1</sup> C Palaniappan<sup>2</sup> M Senthil Kumar<sup>3</sup> and Dr B. Sekar<sup>4</sup>

<sup>1,2&4</sup> Pasteur Institute of India, Coonoor

<sup>3</sup>Muthayammal Arts and Science College, Namakkal

Diphtheria-Tetanus-Pertussis (DTP) group of vaccines consist of purified Diphtheria toxoid, Tetanus toxoid and heat inactivated Bordetella pertussis organisms. The estimation of protein nitrogen content in the toxoid samples prior to formulation with adjuvant is one of the important quality control tests. The antigenic purity of the BPDT and BPTT depends on the amount of protein nitrogen present in the samples. With the given quantity of Lf/ml, the antigenic purity is better with low protein nitrogen content and vice-versa. In the present study the protein concentration of BPDT and BPTT is determined by the Kjeldhal method and Lowry's method. The protein content of 12 batches of purified toxoid samples obtained by these two methods is almost identical. The antigenic purity of the purified toxoid is expressed as ratio of the toxoid concentration (Lf/ml) to protein nitrogen concentration. The purified Diphtheria and Tetanus toxoid shall pass the test if it contains no fewer than 1500 and 1000 Lf/mg of protein nitrogen respectively. In general Kjeldhal method is more time consuming process and it takes several hours to determine the protein content of the BPDT and BPTT samples. Lowry's methods of protein estimation is simple, economical and time saving process and this method may be used as an alternative method for protein estimation in purified toxoid samples.

#### EFFECT OF SYNTHETIC MEDIUM FOR TETANUS TOXIN PRODUCTION

T Lalitha<sup>1</sup> Dr (Mrs) Jeeva Kalaiselvan<sup>2</sup> Ms R Ruth Evangeline<sup>3</sup> and Dr B Sekar<sup>4</sup>

<sup>1,2,3</sup> Pasteur Institute of India

<sup>4</sup> K.S. Rangasamy College of Arts and Science, Tiruchengode

#### ABSTRACT

Tetanus is an infectious disease caused by highly toxigenic strain of Clostridium tetani. The toxin is highly potent and blocks inhibitory neurotransmitters in the central nervous system and causes muscular stiffness and spasms typical of generalized tetanus. According to WHO report about 29000 deaths occurred between 2000-2003 in India mainly due to neonatal tetanus. An antigenic substance, is used to provide immunity. The regular production medium namely Mueller and Miller contains meat infusion as one of the important gradient which is of animal origin. In this current study osy protein, a vegetable base, used to supplement meat based one. Glucose was used as carbon source based on the earlier work of profirio.z.. et.al., in 1997. A study was attempted to standardize the optional concentration of soy protein based infusion in the place of



meat infusion in the basal M.M. medium for the cultivation of the tetanus vaccine strain. The cultivation was done in the beakers by varying the concentration of the soy protein. Soy peptone in the concentration of 20% and 80% and infusion in the concentration range of 20%, 40% and 80% yielded good toxin. The toxin samples were subjected to various analysis like SDS PAGE, Lf test, MLD and MTV. The results are comparable with the conventional medium. This work needs some more trials to come to a logical conclusion.

#### Comparative study of synthetic media and modified Muller and Miller Media for tetanus toxin production

S. Naveen Kumar, M. Aarthi Sathyamugi, B. Yuvankrishnan, Abeesha Ravindran  
Supervisor: Smt. T. Lalitha

Tetanus is caused by the release of neurotoxin by Clostridium tetani which is known as tetanospasmin. Immunization is done against Tetanus disease through anti tetanus toxin i.e. TT vaccine. The tetanus toxin produced is inactivated with formaldehyde in order to produce tetanus toxoid which is administered as TT vaccine. The regular production media used for the production of tetanus toxin is Muller and Miller media. MM media is composed of meat or dairy products which might invite contamination of priors and other antigenic proteins. Latham et al has developed a media (modified Muller and Miller media) by eliminating animal protein source such as meat infusion and by addition of nicotinic acid, vitamin B12 and paraminobenzoic acid. This is also being used for the regular production of tetanus toxin. Derman et al. has developed another set of media (synthetic media) by replacing animal source products with soya products. Our study is to compare the toxin yield and purity of the toxin produced from both these media to determine the effective media that can replace Muller and Miller media. Modification in the regular seed media has also being done in order to ensure the complete growth of organism initially in animal free media. The effective media for the production of toxin was determined in terms of MTV, MLD and Lf/ml.



#### ARTICLE PRESENTED IN JOURNAL CLUB BY THE PH.D. SCHOLARS

S. No	Name of the Presenter	Title of the Article	Author	Publication Details	Date
1.	Ms. K. Suganya	High dietary salt intake exacerbates <i>Helicobacter pylori</i> induced gastric carcinogenesis	Jennifer A. Gaddy et.al.	Journal of American Society Microbiology – Infection and Immunity June 2013, Vol.81, Article No.60	5.04.2014
2.	Shri T.I. Navinraj	Recognition of Riboflavin and the capsular polysaccharide of <i>Haemophilus influenzae</i> type b by antibodies generated to the hapenic epitope D-ribitol	G. Ravi. Yeldur,	Glycoconj-Springer 2014, 31:247-258	26.04.2014
3.	Ms. S. Preethi	A novel method for enhancement of peptide vaccination utilizing T-cell epitopes from conventional vaccines	Akira Yano et.al.	Vaccine 31 (2013) 1510-1515	19.05.2014
4.	Shri T. Sekar	Long-term stability of vero cell-derived inactivated Japanese Encephalitis vaccine prepared using serum free medium	Hiroko Toriniwa, Tomoyoshi Komiya	Vaccine 26 (2008) 3680-3689	13.06.2014
5.	Mrs. N. Gayathri	Purification of integral major outer membrane protein from <i>Salmonella typhi</i>	Arockiasamy Al Krishnaswamy S.	Anal Biochem. 2000 Jul 15;283(1):64-70.	28.06.2014
6.	Shri V. Raja Karthikeyan	An overview of Tetanus Toxin			06.09.2014
7.	Shri G. Chandramohan	Extracellular Biosynthesis, characterization and Antibacterial activity of silver nanoparticles synthesized by <i>Bacillus subtilis</i> (NCIM-2266)	M. Saravanan, Vinoy Jacob, Jesu Arockiaraj and P. Prakash	Journal of Bionano Science Vol.8:1-7, 2014	20.09.2014
8.	Shri B. Karthick	Recombinant Mycobacterium bovis BCG expressing Pertussis Toxin subunit S1 induces protection against an intracerebral challenge with Live <i>Bordetella pertussis</i> in mice	Ivan P Nascimento et.al	Infection and Immunity, Vol.68; No.9, Sep.2000 Page 4877-4883	28.10.2014
9.	Ms. S. Preethi	Production and purification of polyclonal antibodies against diphtheria toxin	Mohammed Ali . Arefpour Torabi et.al	Journal of Applied Biotechnology Reports, Vol.1, Issue2, Spring 2014; 67-72	09.12.2014
10.	Shri G. Chandramohan	Enhancement of immunogenicity and efficacy of a plasmid DNA rabies vaccine by nanoformulation with a fourth-generation amino-terminated poly (ether amine) dendrimer	Padinjarematathil Thankappan Ullas et. Al.	International Journal of Nanomedicine 2014;9:627-634	13.02.2015
11.	Shri B. Karthick	Cloning and expression of S1 subunit of Pertussis Toxin in <i>Escherichia coli</i>	Abofazi hafri et. Al.	Avicenna Journal of Medical Microbiology Vol.3, No.1, Jan.-Mar.2011	24.03.2015



## List of students registered (full-time) for Ph.D. programme under Bharathiar University, Coimbatore

Sl. No.	Name of the Candidate	Title of the Ph.D. thesis	Supervisor/Guide
1.	Shri T. I. Navinraj	A pilot scale <i>Haemophilus Influenzae</i> Type b vaccine	Dr. A. Premkumar
2.	Smt. K. Suganya	A pilot scale <i>Helicobacter pylori</i> whole cell vaccine	Dr. A. Premkumar
3.	Smt. S. Bhavani Priya	A pilot scale <i>Staphylococcus aureus</i> whole cell vaccine	Dr. A. Premkumar
4.	Ms. S. Preethi	Construction of Recombinant Diphtheria toxin	Dr. B. Sekar

## Staff (Part-time) registered for Ph.D. programme under Bharathiar University, Coimbatore

Sl. No.	Name of the Candidate	Title of the Ph.D. thesis	Supervisor/Guide
1.	Dr. Anjan Jyoti Nath	Evaluation of quality attributes of Rabies vaccines commercially available in India	Dr. K. R. Mani
2.	Shri T. Sekar	Preparation of Rabies Antigen in Bio-reactor, and analysis of serological and HPLC methods, formulation of vaccine different composition and stability and immunogenicity analysis.	Dr. A. Premkumar
3.	Shri G. Chandramohan	Recombinant Rabies vaccine	Dr. A. Premkumar
4.	Shri V. Raja Karthikeyan	Increased production of tetanus toxin	Dr. N. Sivananda
5.	Shri B. Karthick	Chimeric fusion of Bordetella pertussis antigens	Dr. B. Sekar

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## List of Officials of this Institute deputed to various places from 01.04.2014

Sl. No.	Name	Designation	Subject	Place/Organisation	Date From To	Particulars
1.	Dr. (Mrs) Sibani Barman	Senior Medical Officer	Conference	Mandya Institute of Medical Sciences, Mandya	05.07.2014 06.07.2014	APCRICON - 2014 Conference
2.	Dr. N. Sivananda	Assistant Research Officer	National Level Seminar	Bharathidasan College of Arts & Science Erode.	30.06.2014 -	Applications of Biochemistry in Healthcare
3.	Dr. N. Sivananda	Assistant Research Officer	Guest Lecture	Vivekananda College of Arts & Science for Women Tiruchengode.	18.08.2014 -	-
4.	Mrs. Baredha Jaffarulla	Head Clerk	Quiz Programme	All India Radio Station, Coim.	29.09.2014 -	General Knowledge Quiz Programme in Hindi.
5.	Sri K. Sivalingam	Library Clerk	Quiz Programme	All India Radio Station, Coim.	29.09.2014 -	General Knowledge Quiz Programme in Hindi.
6.	Dr. N. Sivananda	Assistant Research Officer	Inaugural Ceremony	Coimbatore - Guest Lecture	07.10.2014 -	Association of School of Biological Sciences.
7.	Dr. K.C. Shivanandappa	Assistant Research Officer	International Symposium	Bharathiar University, Coimbatore.	10.10.2014 11.10.2014	On Research Innovation for quality improvement in higher education.
8.	Dr. S. Jagannathan	Assistant Research Officer	International Symposium	Bharathiar University, Coimbatore.	10.10.2014 11.10.2014	On Research Innovation for quality improvement in higher education.
9.	Dr. S. Jagannathan	Assistant Research Officer	One day Seminar	Dr. R. V. Arts & Science College, Mettupalayam Rd, Karamadai Road, Coimbatore.	17.10.2014 -	On Recent Innovation in Biosciences - NSRIB 14
10.	Dr. B. Sundaran	Assistant Director - II	Meeting	CDSCO (HQ), FDA Bhawan New Delhi	16.01.2015 14.01.2015	All Vaccine Manufacturers and Importers on "Current National and International Scenario" on Vaccine Development and its Regulations.
11.	Dr. S. Jagannathan	Assistant Research Officer	One day Conference	Bharathi Women's College, Chennai, - to deliver a Guest Lecture	06.02.2015 -	Biodiversity and Human Health: New Perspective.
12.	Dr. B. Sundaran	Assistant Director - II	International Conference	Hindusthan College of Arts Science, Coimbatore.	26.02.2015 -	Recent advances in Bionanoscience and Technology.
13.	Dr. B. Sundaran	Assistant Director - II	Indian Manufacturers meeting	CDSCO, New Delhi.	26.04.2015 26.04.2015	To participate in the Working Group III (Post Approval changes).

**CONFERENCE/SEMINAR/MEETINGS ATTENDED BY THE DIRECTOR, P.I.  
COONNOR**

Sl. No.	Name of the Conference/Meeting	Organisation/Place	Period		Particulars
			From	To	
1.	Annual Conference of Association for Prevention and Control of Rabies in India	Mandya Institute of Medical Sciences, Mandya	05.07.2014	06.07.2014	Delivered a talk on "Status of Rabies Free Nilgiris"
2.	Pre Scientific Advisory Committee meeting	National Institute for Research in Tuberculosis, Chennai	09.10.2014	10.10.2014	Special Invitee for the Pre Scientific Advisory Committee meeting
3.	Public Viva Voce examination of Ph.D. Scholar	Tamilnadu Dr. M.G.R. Medical University, Chennai	24.10.2014	---	As external examiner to conduct the Public Viva Voce examination
4.	Governing Body meeting of National Institute of Biologicals, Noida	Chamber of Secretary (Health & Family Welfare)	12.12.2014	---	As a member of the Governing Body of NIB, Noida
5.	Meeting of all vaccine manufacturers and importers	CDSO, New Delhi	15.01.2015	---	Participated in the meeting on "Current National and International Scenario on Vaccine Development and its Regulations"

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**THE TEAM**

<b><u>Office Superintendent</u></b>	28. Shri M. Dayalan
1. Mrs K. Mahalakshmi	29. Shri B.J. Basavaraj
2. Shri L. Nanjappa	30. Shri S. Sadhasivam
3. Shri B. Krishnamurthy	31. Shri K.B. Balakrishnan
4. Mrs K. Saroja Devi	32. Shri B. Iyer
<b><u>Foreman</u></b>	33. Shri B. Pandurangan
5. Shri R. Mohan	34. Shri B.B. Shanmugam
<b><u>Sr. Research Assistant</u></b>	35. Shri M. Subramani
6. Shri G. Chandra Mohan	36. Shri A. Jaffarulla
<b><u>Sr. Technical Assistant</u></b>	37. Mrs Rajalakshmi. V
7. Shri K. Murthy	38. Shri S. Govindaraj
8. Shri P. Radhakrishnan	39. Shri K. Devaraj
9. Shri M. Madhavan	40. Shri N. Ragupathi
10. Shri M. Bellan	41. Shri N.M. Ramakrishnan
11. Shri D. Chandran	
<b><u>Head Clerk</u></b>	<b><u>Maintenance Supervisor</u></b>
12. Mrs R. Rajeswari	42. Shri T.G. Irudayaraj
13. Shri M. Raman	43. Shri S. Basavaraj
14. Shri R. Ram	
15. Mrs S. Sasikala	<b><u>Laboratory Technician</u></b>
16. Shri T.K. Balakrishnan	44. Shri T. Sigamani
17. Shri S. Ravi	45. Shri A. Sathar
18. Mrs Baredha Jaffarulla	46. Shri P. Shanmugam
19. Mrs Shanthi Subramani	47. Shri R. Sathyamurthy
20. Shri R. Kanagaraj	48. Shri K. Krishnan
21. Shri R. Dharmalingam	49. Shri J. Shankaran
	50. Shri R. Arumugam
	51. Shri S. Mani
	52. Shri P. Paramasivam
	53. Shri A. Paulraj
	54. Shri G. Joghee
<b><u>Pharmacist</u></b>	55. Mrs Rubasundari Natarajan
22. Shri P. Venkatachalam	56. Mrs R. Manjula
	57. Mrs Meera Chinnappan
<b><u>Research Assistant</u></b>	58. Shri M. Pasupathy
23. Mrs H. Shanthila Premkumar	59. Shri P. Subramanian
24. Shri V. Raja Karthikeyan	60. Shri R. Gopalakrishnan
	61. Shri A. Victor
	62. Mrs Uma Subramani
<b><u>Technical Assistant</u></b>	63. Mrs Melan Basavaraj
25. Mrs Victoria Jeyaraj	64. Mrs Jayakumari K.
26. Shri B.H. Bellie	65. Shri K. Shankaran
27. Shri N. Kesu	

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66. Shri N. Chandran  
 67. Shri B. Raju  
 68. Shri S. Chandrasekaran  
 69. Shri G. Mudalagiri  
 70. Shri K. Rajendran  
 71. Shri B. Batin  
 72. Shri R. Raja  
 73. Shri C. Selvaraj  
 74. Shri P. Vasu  
 75. Shri P. Paneriselvam
- Maintenance Technician**  
 76. Shri V. Ravi  
 77. Shri C. Subramanian  
 78. Shri A. Rajappa  
 79. Shri M.E. Sridhar
- Heavy Vehicle Driver**  
 80. Shri V. Ravichandran

**Staff Car Driver**

81. Shri R. Yesudoss

**Upper Division Clerk**

82. Shri A. Louis  
 83. Shri D. Anurag  
 84. Shri P. Mani  
 85. Shri N. Kuppasamy  
 86. Shri S. Chandran  
 87. Shri C. Doraiswamy  
 88. Shri R. Dhurairajan  
 89. Shri B. Karthick  
 90. Shri Y.D. Praveen

**Laboratory Assistant**

91. Shri D. Jaganathan  
 92. Shri B. Lakshmanan  
 93. Shri S. Peter  
 94. Shri K. Krishnan  
 95. Shri V. Muthu  
 96. Shri C. Arumugam  
 97. Shri R. Krishnamurthy  
 98. Mrs B. Rangalakshmi  
 99. Shri A. Raghavan

100. Shri R. Ayyavoo  
 101. Shri R. Karuppan  
 102. Shri R. Gunasekaran (Senior)  
 103. Shri J. Joseph  
 104. Shri S. Munuswamy  
 105. Shri A. Mani  
 106. Shri M. Subramani  
 107. Shri S. Umapathy  
 108. Shri K. Ravichandran (Sr)  
 109. Shri M.B. Raju  
 110. Shri A. Dhanabalan  
 111. Shri M. Radhakrishnan  
 112. Shri S. Lingam  
 113. Shri C. Vadivelu  
 114. Shri B. B. Sundaran  
 115. Shri R. Gunasekaran (Junior)  
 116. Shri K. Arumugam  
 117. Shri P. Periaswamy

**Maintenance Assistant**

118. Shri B. Nataraj  
 119. Shri C. Alexander Joseph  
 120. Shri R. Ravi  
 121. Shri R. Saravanan  
 122. Shri V. Radhakrishnan

**Library Clerk**

123. Shri K. Sivalingam

**Truck/Van Driver**

124. Shri G. Thanaraj  
 125. Shri P. Rajendran  
 126. Shri S. Krishnamoorthy

**Duffadar**

127. Shri S. Ragunathan

**Multi Tasking Staff**

128. Shri S. Kanagasabapathy  
 129. Shri S. Devanbu  
 130. Shri M. Murugan  
 131. Shri S. Chandrasekaran  
 132. Shri B. Sivalingam  
 133. Shri K. Elancheran

134. Shri M. Gunasekaran  
 135. Shri L. Murthy  
 136. Shri K. Manoharan  
 137. Shri R. Manisekaran  
 138. Shri T. Vijayakumar  
 139. Shri T. Malleswaran  
 140. Shri N. Mohan  
 141. Shri V. Vijayan  
 142. Shri R. Mohan  
 143. Shri N. Poornachandran  
 144. Shri G. Ravi  
 145. Shri R. Siddayan  
 146. Shri R. Vasudevan  
 147. Shri P. Krishnaswamy  
 148. Shri R. Durai  
 149. Shri K. Ravichandran (Jr)  
 150. Shri T. Natarajan  
 151. Shri R. Sreenivasan  
 152. Shri M. Thiyagarajan  
 153. Shri S. Gangadharan  
 154. Shri Y. Vincent Heuman  
 155. Shri J. Selvan Vincent Raj  
 156. Shri A. Velmurugan  
 157. Shri S. Murugan  
 158. Shri M. Murugan  
 159. Shri M. Thirumoorthy  
 160. Shri K. Mani  
 161. Shri K. Ambiraj  
 162. Shri D. Surendran  
 163. Shri R. Dhammaraj Shammuga  
 164. Shri S. Anandan  
 165. Shri K. Ganesan  
 166. Shri K. Manohar  
 167. Shri V. Jayaraman  
 168. Shri S. Pakkiarayan  
 169. Shri A. Singaravelu  
 170. Shri V. Kanagaraj  
 171. Shri A. Karuppiah  
 172. Shri P. Nandakumar  
 173. Mrs B. Jayalakshmi  
 174. Shri M. Ganesan  
 175. Mrs Dhanamani Murugesan  
 176. Shri R. Raghu  
 177. Shri R. Gunasekaran

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178. Miss B. Saroja  
 179. Shri G. Saravanamoorthy  
 180. Shri B. Ramu  
 181. Shri L. Murali  
 182. Shri N. Ramadass  
 183. Shri M. Ravindran  
 184. Mrs R. Parvathi  
 185. Mrs M. Geetha  
 186. Shri ChandraBahadur Karki  
 187. Shri Min Bahadur Katri  
 188. Shri Bommiraj Bahadur  
 189. Shri K. Heera Bahadur  
 190. Mrs K. Kalavathi  
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 193. Mrs Lissy Easwaran  
 194. Mrs Sivarani  
 195. Mrs D.R. Latha  
 196. Shri G. Ramesh  
 197. Shri S. Balasubramani  
 198. Shri A.K. Jithendran  
 199. Shri A. Senthilkumar  
 200. Shri G. Saravanan  
 201. Shri P.K. Anandan  
 202. Shri R. Vinoth  
 203. Shri B.N. Haldurai  
 204. Mrs S. Pavithra  
 205. Mrs. M. Mahalakshmi

