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## In This Issue...

**Reminiscence into history of Medical Research in India with contributions of Indian Council of Medical Research (ICMR) over last hundred years**

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### Reminiscence into history of Medical Research in India with contributions of Indian Council of Medical Research (ICMR) over last hundred years

India is the land of great discoveries, innovations, ethnic diversity, geographical variations and seat of culture and education. India's contributions in the field of science during earlier part of the history are well known. The contributions of Aryabhata, Sushruta, Varahamihira and Bhaskara are important landmark in the history of science. Advancement in science since from the ancient times can be found in terms of astrological science, mathematics, geometry and material science depicted in many ancient Indian literature and architecture. The oldest Indian literature 'Atharvaveda' describes about the Yoga, the human physiology, different ailments, their causes and prevention of many life threatening diseases. The medical science propelled and prospered during the time of Charaka and Sushruta during 1600 BC and Ayurveda gained strong foothold in Indian cultural heritage long back. The *Charaka Samhita* and *Sushruta Samhita* became landmark classic literary treasure of diseases and their prevention. However, there was a sudden break in scientific achievements after twelfth century due to various historical factors although in certain areas such as astronomy, the tradition continued and resulted in the setting up of observatory at Jaipur and Delhi.

Science in the modern sense, took root in India in the eighteenth century. The establishment of the Asiatic Society of Bengal by Sir William Jones in 1784 was an outcome of the interest created at that time in scientific research. The society played a prominent part in the development of scientific activities in India. The society also brought out *Asiatick Researches* which was the first Indian periodical started in 1788 and was later changed to *Journal of the Asiatic Society of Bengal* in 1832. The Medical and Physical Society of Calcutta was formed in 1823 and its *Transactions* were the first professional medical periodical published in India. During the nineteenth century a number of organizations were set up for encouraging scientific work in various disciplines such as Zoology, Botany, Anthropology, Mathematics, Physics, Chemistry, Meteorology, Geology, Medical

Science etc. The Trigonometrical Survey (1800), the Geological Survey (1851), the Archeological Department (1862), the Indian Museum (1866), the Indian Coastal Survey (1875), Indian Meteorological Department (1875), the Botanical Survey (1890) and other periodical survey opened up vast and previously almost untouched fields of investigations.

Medical Colleges were started in Madras and Calcutta in 1835 and in Bombay in 1845. Medical Research was placed as on organized basis in 1869. With the abolition of Presidential System, all the three Medical Departments were amalgamated to form Indian Medical Service (IMS) in 1896. Many initiatives were taken and laboratories of high excellence including Indian Research Fund Association (IRFA-1911) were established. The Indian Science Congress was inaugurated in 1914, with Sir Ashutosh Mukherjee as its first President. The Zoological Survey of India was set up in Calcutta in 1916. The Bose Institute was established in Calcutta in 1917 by Sir Jagdish Chandra Bose and was famous for its pioneering work in biophysical research. In 1930, the All India Institute of Hygiene & Public Health was established in Kolkata.

The modern era of medical science began with the arrival of British Empire in India and many path breaking discoveries were made during that regime. When Britisher's came in to power, India was facing the challenges of diseases like malaria, filariasis, kalazar, leprosy, tuberculosis, plague and many other Nutritional disorders and vast areas, difficult terrain and undulated landscape with socio-cultural diversity made its control a difficult enterprise. There was no organized medical organization in the country and health services were in pathetic condition.

### **The Beginning of Tropical Medicine and Medical Research with reference to Indian Initiatives**

The beginning of Tropical Medicine in fact started in last 20 years of the 19<sup>th</sup> century which includes the Charles Laveran's discovery of the malaria parasite in 1880, Koch's discovery of the cholera vibrio both in Egypt and India in 1884-85, Vandyk Carter's work in Bombay on the spirillum of relapsing fever in 1877-80, Sir Patrick Manson's observations in connection with filarial mosquitoes in 1879-1883 and Kitasato's discovery of the plague bacillus in 1894. In 1897, Sir Ronald Ross, then the member of the Indian Medical Service, working on the lines that had been hypothesized by Manson, succeeded in demonstrating

and establishing the role of Anopheles mosquitoes in the transmission of the malaria. This opened new vistas and important field in the medical research to which were attracted numerous enthusiastic workers and research in tropical medicine received an impetus. Two Schools of Tropical Medicine were established in England; one in London and the other in Liverpool<sup>1</sup>. India was not slow and the attention of the research workers was chiefly directed to the visitation of Plague that needed urgent attention for medical research at that time. In the early years of the 20<sup>th</sup> Century IMS was fortunate enough to attract a large number of men with a bent for medical research. At that time IMS could not boast of any special research department, but the investigations carried out, often in the face of great difficulty, and with little or no official encouragement did much towards the creation of many research institutions.

In the early years of the 20<sup>th</sup> century facilities for systematic investigation of problem of tropical and other diseases were first provided in India. This commenced with the establishment of laboratories in different parts of India, the intention being to provide a central laboratory and to encourage the formation of laboratories in the major provinces wherever they could suitably be situated. The establishment of Pasteur treatment in India necessitated the provision of laboratories for the purpose and this fitted in with general requirements. Over a period of years the laboratories established were the Central Research Institute, Kasauli, under the GOI, The Plague Research Laboratory at Parel was extended, re-equipped and renamed as bacteriological laboratory for the Bombay Presidency also known as the Bombay Bacteriological Laboratory (now Haffkine Institute), at Parel, the King Institute at Guindy for the Madras Presidency and the Pasteur Institutes at Kasauli, Coonoor, Shillong and Rangoon. The Pasteur Institutes in most cases also did the general laboratory work<sup>2</sup>.

### **Health Policies of Pre-independent India**

A Royal Commission appointed in 1859 and reporting in 1863, recommended the formation of '*Commissions of Public Health*' in the presidencies of Madras, Bombay and Bengal. These commissions were soon replaced in each presidency by '*a Sanitary Commissioner*' with an assistant. Sanitary inspector-General, afterwards called sanitary commissioner, were appointed in other provinces and sanitary and vaccination staff were gradually amalgamated<sup>3</sup>. In 1888, Lord Dufferin's Government issued a resolution

drawing the attention of local bodies and village unions to their duties in the matter of sanitation; and the '*Sanitary Boards*' were formed in every province. A new Department of the Government of India was created in 1910 in order to relieve the Home Department of Education, Sanitation and some other branches of the administration. In addition to sanitary conferences held by local governments, three all India level sanitary conferences were convened at Bombay, Madras and Lucknow respectively, over which the Hon'ble Sir Harcourt Butler presided as Member of the Governor-General's Council in charge of the Department concerned.

As a result of the Plague Commission's Report, Lord Curzon's Government took up with vigour the reorganization of the Sanitary Department. Research Institutes were started and an appointment of the '*Sanitary Commissioner*' with the Government of India was created. The function of this officer was to advise the Government of India upon sanitary and bacteriological questions, to settle with local government the principles on which an advance should be made and to organize and direct research throughout India. But all questions of personnel as well as the administration of the bacteriological department and research generally were placed under the control of

### Setting-up of Health Services/Health Administration in India before Independence

The history of western medicine in India dates back to 1600 when first Medical Officer arrived in India with British East India Company first fleet as ship's surgeons<sup>5</sup>.

- 1757 – East India Company established its rule in India
- 1764 – Medical Department established in Bengal for rendering troops and servants of the company.
- 1775 - Hospital Boards were formed to administer European Hospital, comprising of Surgeon General & Physician General, who were in the staff of the Commander-in-Chief of the Royal Indian Army.
- 1785 – Medical Departments were set up in Bengal, Madras and Bombay presidencies.
- 1788 – Lord Cornwallis, Governor General of India, issued orders that Medical Officers were not permitted to join Civil Services until serving 2 years in the army.
- 1796 - Hospital Boards were renamed as Medical Boards to look after the civil part of the Medical Departments.
- 1835- With the opening of Calcutta Medical college, IMS was opened to natives of India trained in Calcutta, who were selected to serve in sub-ordinate Military Medical Service or as Asstt Civil Surgeons to serve in sub Divisional Civil Hospitals.
- 1857 – Different Departments of civil services were developed.
- 1868 - Separate civil Medical Department was formed in Bengal. A public Health Commissioner and a Statistical Officer were appointed to Govt of India.
- 1896 - With the abolition of the Presidential System, all the three presidential Medical Departments viz., Bengal, Madras and Bombay Presidencies were amalgamated to form the Indian Medical Service (IMS). The officers of the Indian Medical Services were mostly military surgeons of European origin who were selected in England. After the development of IMS medical duties for the Royal Indian Army were performed by the Army Medical Dept later called Royal Army Medical Corps (RAMC). Medical Departments were under the control of Central Government until 1919.
- 1896-1900 – 10 Indian entered the IMS
- 1919- The Montgomery-chelmsford constitutional Reforms of 1919 led to the transfer of public health sanitation & vital statistics to the provinces. This was the first step in decentralization of health administration in India.
- 1920-21- Municipality and Local Boards Acts were passed containing legal provisions for advancement of public health in provinces.
- 1935 – Govt of India Act 1935 gave further autonomy to provincial Govts.

the '*Director General*', Indian Medical Services, with '*Sanitary Commissioner*' as his staff officer.

The policy of the Govt of India was to keep the control of research under itself but to decentralize other branches of sanitation. The '*Sanitary Commissioner*' with the Govt of India was a touring officer empowered to consult and confer informally with local Governments. In every province, '*Sanitary Boards*' were composed. The problems of public health in India were vitally complicated by the fact that biting insects were a prominent factor in the dissemination of disease. A substantial beginning was thus made for the development of a Department of Public Health.

The Sanitary Commissioner to the GOI supervised sanitation, vaccination and vital statistics. The '*Public Health Commissioner*' and '*Statistical Officer*' were responsible for Public health matters. The functions of the central staff were surveys, planning, co-ordination, programming and regulations of all health matters in the country.

#### Setting-up of Chain of Research Institutes/Laboratories of High Excellence including Indian Research Fund Association and Cadre of Scientific workers

With the valuable contributions made by Leeuwenhock, Ehrlich, Jenner, Lister, Pasteur *etc*,

flair for medical research on modern lines spread widely to several countries including Indian sub-continent. During the 19<sup>th</sup> century medical officers in India working on their own initiatives and with limited laboratory resources made important contributions from time to time, to the knowledge of tropical diseases. Some of the classical examples of such studies are those of Lewis on trypanosomes and filariasis, Vandyke Carter on spirilla, leprosy and mycetoma, Macnamara on cholera and Fayer on snake and snake-venoms. In later half of the century, however, the Govt of India initiated and extended the practice of deputing its own officers, whenever needed, to study some of the special problems facing the country. Examples of this nature include deputation of Cunningham and Timothy Lewis to work on problems of cholera and malaria, of Giles on kala-azar and beri-beri & of Haffkine on Plague, whose contributions to their respective problems are well known. Attempts at planned medical research may however, be said to date back to 1894 when the '*Indian Medical Congress*' submitted resolutions to the Government urging the establishment and endowment of research institute. Consideration of these resolutions by the GOI and the need created by the occurrence of certain epidemics in the country, led to periodical proposals for the establishment of central and provincial laboratories, some of which bore fruits and a series of laboratories, thus established and some of them even

#### An Impetus to Medical Research with setting up of Indian Medical Service and Establishment of Institutes of Excellence in early part of 20<sup>th</sup> century

In 1884, the foundation stone of India's first medical laboratory was laid down. A central laboratory was established in Kasauli near Shimla. It was for research purpose. Provincial laboratories were established at major provincial Headquarters to carry out public health and Bacteriological work<sup>5</sup>. Chain of laboratories/institutes established and medical services geared up are as follows:

#### Indian Medical Service (IMS)

All the three Medical Department *viz.*, Bengal, Madras and Bombay Presidencies were amalgamated to form the IMS in 1896. Under IMS a work force of Scientific Workers was established in the name of **Bacteriological Department** which was later renamed as **Medical Research Department**.

The Indian Medical Service offered many attractions to young Doctors during an active life abroad. The service had two branches, one Military with duties in relation to Indian Army very similar to those of Royal Army Medical Corps in British Army, and the other Civil responsible for the health of the civil population and where there were greater opportunities and wider choice for professional work including professorship in colleges and in research. Sir Ronald Ross served in the IMS until 1899. This was the era when mysteries of tropical medicine were being unraveled by pathologists of the British and Indian armies and it would be difficult to assess the influence of men like Bruce, Leishman, Semple, Christophers and Rogers on the course of tropical medicine and pathology.



### Central Research Institute (CRI)

In the early years of the 20<sup>th</sup> century, the Sanitary Commissioner with GOI initiated a scheme for the establishment of a Bacteriological Department and a Central Institute for Medical Research in India. This scheme met with approval of GOI and in 1904 work was commenced on what was later known as Central Research Institute of India. Central Research Institute (CRI) was opened in 1906 in Kasauli, Himachal Pradesh under the Directorship of Lt Col Sir David Semple (1906-1913), who was succeeded by Lt Col W F Harvey (1913-1925), Col Sir S R Christophers (1925-1932), Major General Sir John Taylor (1932-1944) and Lt Col H W Mulligan (1944-1947). After this, Lt Col M L Ahuja took over as First Indian Director of the Institute.

### Indian Research Fund Association (Now ICMR)

Indian Research Fund Association was established in 1911 to further prosecution of research and propagation of knowledge and experimental measures generally in connection with the causation, mode of spread and prevention of communicable diseases and to fund and support research activities in other areas as well.

### Plague Research Laboratory (Bombay Bacteriological Laboratory)

The Plague Research Laboratory at Parel was extended and re-equipped and renamed as bacteriological laboratory for the Bombay Presidency also known as the Bombay Bacteriological Laboratory (now Haffkine Institute), at Parel,

### King Institute at Guindy, Madras

The King Institute of Preventive Medicine & Research at Guindy for the Madras Presidency was established in 1903 with aim of protecting against scourging infections and was named after Lt Col W G King, then Sanitary Commissioner of Madras Presidency. It is one of the major institutions in India for eradicating small pox by production of vaccine.

### Pasteur Institutes

In 1900, the Indian Pasteur Institute for treatment of patients bitten by rabid animals was started in Kasauli and later Pasteur Institutes at Coonoor, Shillong and Rangoon were also established. The Pasteur Institutes in most cases also did the general laboratory work. The Pasteur Institute to which Sinton was attached in 1921 occupied a separate site in Kasauli from about 1903 until 1936, when it was absorbed in Central Research Institute and housed in new building on its site. Lt Col Gorden Covell was the last Director of the independent institute. Lt Col Sir David Semple who was commissioned in the army medical service in 1883, was Director of the institute from 1900 to 1905 and then Director of CRI from 1906 to 1913. Most of these luminaries and institutes were working in synergism with IRFA

### Central Malaria Bureau & Malaria Survey of India

A Central Malaria Bureau was established at Kasauli in 1909 under the central committee. In 1916 a malaria organization for India had been put forward and implemented following the Imperial Malaria Conference held at Shimla in that year. A central malaria committee and provincial malaria committee for each of the eight provinces of India was formed. In 1925 sanction was obtained for the establishment of central malaria organization to be established at Kasauli and to be known as Malaria survey of India. The Malaria Survey of India was housed in buildings belonging to the CRI, *but in all other respect independent being financed and administered by IRFA*, which received special government grants but was largely independent in many ways resembling Medical Research Council in England. Sinton was appointed as the first Director and brought together all the enquiries and investigations under the new organization. He was Director until his retirement in 1936. He was succeeded by Lt Col Gorden Covell. In 1937 the Govt of India decided to take over the public health and advisory function of the survey and the whole organization was renamed as **Malaria Institute of India** and moved to Delhi. As Director, Sinton was ex-officio a member of Scientific Advisory Board of the IRFA. He was also a member of Malaria Commission of the League of Nations and coordinating officer for this body.

Although there were many ground breaking works on variety of diseases, which helped in prevention of epidemics, but due to lack of funds and other difficulties innovations were discouraged. In late 19<sup>th</sup> and early 20<sup>th</sup> century, the situation improved and it was widely accepted that medical research was an integral part of preventive medicine.

working today as an important national institute and carrying out medical research<sup>4</sup>.

To illustrate the ravages of enteric fever and cholera led to the establishment of a '**Bacteriological Laboratory**' at Agra in 1892 with Mr P H Hankin as its Head. In 1896, plague appeared in Bombay and spread widely taking the country by surprise. It may be claimed that as stated by Sir Pardey Lukis, that plague did for medical research in India what some 60 years earlier cholera did for sanitation in England. Its sudden appearance in Bombay and further spread to other regions, led to the deputation of W M Haffkine to work on this problem and subsequently to the appointment of number of '**Plague Commissions**' by UK, India, Germany and Russia to investigate the epidemiology of the disease in India<sup>4</sup>. One of the important recommendation of the first Indian Plague Commission was to establish laboratories with suitable experts to undertake investigations and to work out the means of prevention of the pressing medical problems. As plans for central and provincial laboratories were developing, a scheme for the provision of Pasteur treatment in India, motivated to some extent by a desire to escape the great expense of sending the soldiers bitten by rabid dogs to Paris was under consideration. The latter came to fruition and the first '**Pasteur Institute**' was established at Kasauli in 1900. Three years later, the '**King Institute**' was established at Guindy for the manufacture of calf-lymph and for general bacteriological work. By 1906, the plan for establishment of a central institute ripened and Central Research Institute was established in Kasauli. In the year 1907, another Pasteur Institute was organized at Coonoor in South India. All these institutes and laboratories were also provided with reasonable facilities for research work.

To staff these institutes, research workers, who had been deputed on special assignments, were freely drawn upon. The efforts were supplemented in 1905, by bringing in to being a cadre of scientific workers, known as **Bacteriological Department** of the Government of India. Originally, 13 officials, mostly members of IMS, constituted this department and were posted at the central and provincial laboratories. These 13 members of the Bacteriological cadre were immobilized in various laboratories and institutes. In 1914, the GOI, enlarged this Cadre under the new name '**Medical Research Department**' increasing its strength to 30, of which pay and allowances of 8 officers were met by the IRFA. However, the progress was interrupted due

to world war, as most of the research workers from the country were drafted to the Army and there was thus a period of abeyance in the research activities in the country<sup>4</sup>.

While the above mentioned developments were taking place, another chapter in the history of medical research in India was being quietly opened. Early in the year 1897, Haffkine, who had been deputed to work on the problem of plague evolved a prophylactic vaccine which was the first to be used on a large scale and with certain modifications remains an effective weapon for the prevention of plague even today. Working in Secunderabad, Surgeon-Major Ronald Ross made the landmark discovery in 1897 which proved beyond doubt that mosquitoes carry malaria. In 1903, Donovan in Madras demonstrated the presence of a parasite, now known as *Leishmania donovani*, in the spleen of cases suffering from Kala-azar. In 1904, Rogers demonstrated by culture that this parasite was a flagellate. These events one after another inspired and stimulated other members of the medical services to engage themselves in research work.

#### **Genesis of Indian Research Fund Association (IRFA)**

By, 1910, a stage was thus set for the continued furtherance of medical research in India, a chain of institutes with facilities for medical research was established, a cadre to scientific workers was created and an attraction for medical research was provided for those with aptitude by the successive epoch-making discoveries of some of the pioneers. Certain difficulties however, were being experienced at this stage. The members of the '**Bacteriological Department**' were getting fixed up in the institutions as Directors and Assistant Directors instead of being freely available for research assignments in the field. Even, in laboratories, they were getting increasingly charged with many administrative duties connected with the manufacture of vaccines, sera and other biological products and with routine laboratory diagnostic work at the expense of the research. The situation then prevailing which was also exploited for creating a separate Governing Body for the newly established School of Tropical Medicine, Calcutta<sup>4</sup>.

A few workers were deputed from time to time to carry out special enquires but the number available who had suitable training for research work was small. It was realized that, with the very large field which existed in India for research in tropical diseases, more

trained workers were required. The **Medical Research Department** created by GOI included the existing staffs of the major laboratories and Pasteur Institutes, along with an additional number of officers specially selected, who were available for whole time research work either as attached to laboratories or conducting investigations in the field<sup>2</sup>.

Provision had to be made for the pay of the additional officers and for the expenses of their investigations, including the cost of assistants and employees of all grades, and the cost of equipment, *etc* and also for financing investigations carried out by other agencies. For this purpose the GOI, thus constituted the Indian Research Fund Association as a local fund administered by Government. An annual grant of Rs. 5 lakh was given to meet the cost of research work along with a sum sufficient to meet the pay of the officers of the Medical Research Department not filling the specified appointments of Directors or Assistant Directors of the laboratories<sup>2</sup>.

Thus it was to get over these various difficulties that the Indian Research Fund Association was founded in 1911, interestingly enough two years prior to the establishment of Medical Research Council in England. Credit goes to the wisdom and foresight of **Sir Harcourt Butler**, first member, Department of Education, Health and Lands (E.H.&L) of the Viceroy's Executive Council and **Sir Pardey Lukis**, the Director General, IMS for bringing this Association into existence. The fund was a local fund, constituted entirely by the GOI, with the hope that private contributions would be forthcoming, a hope that did not achieve any significant fulfillment except for two generous donations of the Maharaja of Parlakimedi and Col Amir Chand.

The primary objective of the IRFA was the prosecution and assistance of research, propagation of knowledge and experimental measures generally in connection with causation, mode of spread and prevention of communicable diseases. The affairs of the Association were entrusted to the Governing body which consisted entirely of govt officers, under the presidentship of Hon'ble Member of the Department of Education, Health and Lands of the Governor-General's Executive Council.

### Governing Body of IRFA

The representation of the Governing body (GB) was both official and non-official. The members include the Secretary, E.H. &L., the Director General,

IMS, representatives elected by the Council of State, the Legislative Assembly and the Medical Faculties of Universities and the Indian Science Congress Association. The duties of the GB were essentially administrative and had full control of the finances of the Association. The GB used to appoint Scientific Advisory Board (SAB) consisting exclusively of Scientists of high standing to advise them on technical matters relating to research and in particular on the allocation of funds to specific investigations. **The Director General, Indian Medical Services was the President, and the Public Health Commissioner, Secretary.** The other members were Directors of the major Institutes who had prolonged experience of medical research in India and three elected members of high standing in the medical profession.

The first meeting of the Governing Body of the IRFA was held at the Plague Laboratory, Parel, Bombay (now Mumbai) on the 15<sup>th</sup> November, 1911, with Sir Harcourt Butler in the Chair<sup>4</sup>. At the very second meeting, the GB of the Association took steps to implement its responsibility with regard to propagation of knowledge by starting a journal for Indian Medical Research. The journal which was designated as *Indian Journal of Medical Research* was then intended to absorb the publication already brought out under the name, *Paludism* and a great majority of the monographs known as *Scientific Memoirs*. This journal is the first official publication of the Association and is being published continuously since July 1913.

The members of the IRFA at that time were the Director General, IMS, The Sanitary Commissioner with the GOI, The Director of the CRI, Kasauli, the Officer-in-Charge of the Central Malaria Bureau established in 1909 and the Asstt Director General, IMS (sanitary), **Sir Ronald Ross** was elected as honorary consulting member. The membership of the IRFA was open to non-officials. Every donar of Rs. 5000 was entitled to become a permanent member, while every subscriber of Rs.100 per annum was entitled to become a temporary member<sup>3</sup>. In 1911, Major S P James, IMS was deputed to study yellow fever in its endemic area and to draw up proposals for protecting India against the introduction of the disease. Besides, financing investigations conducted by its own staff, the Association gave grants-in-aid to outside research on approved lines.

Applications for grants towards the cost of specific research projects were made to the Secretary, IRFA, by

### Major Diseases India faced during beginning of the 20<sup>th</sup> century and role played by IRFA

1896- 3<sup>rd</sup> pandemic of Plague struck India. Infection was introduced by ship from Hong Kong as Plague was rampant in China at that time.

1898-99 – English, German and Australian commission were working on Plague in India

1897 – Dr PL Simond worked single handedly studying the epidemiology of Plague in Bombay. He drew the conclusion that infection usually spread from rat to man and less frequently from man to man. The role of rats in the spread of infection established. Simonds views were not accepted until the Plague commission arrived in 1905 with same conclusion.

1905 – Indian Plague Commission. Dissemination of *Xenopsilla cheopis* occurred due to trade after opening of Suez Canal particularly cotton with Egypt.

Plague raged with unabated fury in first 2 decades, taking heavy toll of life. There were over 10 million deaths during that period or nearly 40% of total deaths were due to Plague. Later it declined and in 1950 there were just over 1% of total deaths in India were due to Plague. The decline was following large scale use of DDT in National Malaria Control Programme.

1911 - IRFA was established in 1911 primarily for communicable diseases, but was less active due to world war I and took steps to promote research in kala azar and cholera. Kala azar was a problem in Bengal and Bihar, 2 states in Gangetic Basin and a Commission was appointed in 1923 to unravel its mysteries.

1918-19 –Plague was showing sign of retreat, India had to face the pandemic of Influenza. There were over a million deaths in the country due to influenza.

1923-24 – Kala azar Commission was appointed.

1930-40s- Renewed national & international interest in cholera. *V. cholerae* was isolated from pilgrims returning from Hedaz to Egypt. The work done in the Ganges delta, traditionally the home of Cholera. Gen Taylor was the chief co-ordinator of cholera projects. Can there be extra-human reservoir of infection in inter-epidemic period was explored? The role of fish was often debated. It was also believed that Hilsa fish (*Hilsa ilisha*) may play a role in maintaining cholera endemicity in India.

1950-60s- While India was struggling to deal with cholera situation, plague again made its appearance in 1960 in small area in Mysore state with over 600 cases in one year. *Pasteurella pestis* was isolated from infected persons. Urban epidemic had its origin in a focus of sylvatic plague and field rodent were found responsible for harbouring the infection *Tatera indica*.

Like cholera- small pox was also a problem in India.

1958 – Committee was appointed under Dr CG Pandit to work out the details of small pox eradication programme. Attempt was to vaccinate entire population.

- ◆ Attempts were made to study systematically the various facets of malaria problem. Contributions made by Malaria Institute of India were well known. DDT used in World war II, on Burma front provided basis for adoption of policy of malaria eradication by Govt of India.
- ◆ About this time attention was drawn quite accidentally to another disease- schistosomiasis in man. During World war I, infection was introduced in to the country by the Indian troops returning from active service in the middle east. An endemic focus of schistosomiasis was discovered in a tiny village Gimvi about 200 miles south of Bombay and 10 miles from sea shore.
- ◆ The history of communicable diseases in India in decades following independence presented many fascinating features. Steps taken by the Govt to control or if possible to eradicate malaria, small pox, leprosy and filariasis. Indian scientists were aware of their responsibilities in research in several facets of the problem.



any person who had suitable experience and facilities. These were considered at an annual meeting of the SAB which also used to review the work of the previous year carried out under the grants from the Association. To help them in this work the SAB used to appoint special advisory committee to deal with each subject of major importance on which research was being carried out at that time. Committees were formed for malaria, nutrition, plague, cholera, tuberculosis *etc*<sup>2</sup>.

After detailed consideration of the proposals the SAB used to submit recommendation for a programme of research for the following year to the GB taking in to accounts the funds available. On final approval by the GB the funds were allotted.

In addition to the annual grants for specific enquiries, which used to renewed from year to year, the Association financed certain research organization of a semi-permanent nature. In this category were the *Nutrition Research laboratories*, Coonoor and the research side of the *Malaria Institute of India* established in 1938<sup>2</sup>.

To expand further the opportunities for experience in medical research the Association tentatively formed a **cadre of Junior Research Workers** and started giving fellowships for the purpose of bringing new workers in to research field.

The cost of the research work carried out under the IRFA was almost entirely borne by the GOI, only a small contributions was made occasionally by local Govts. Towards the cost of enquiries which had special importance to their provinces.

There was a degree of elasticity in the methods of administration which permitted of urgent problems being taken up at once and the individual research worker was a given a wide measures of independence in the selection of his subject and in the conduct of his investigation. Hence, IRFA presented many advantages to deal with the medical research in India and laid firm foundation for future researches in medical science.

*Sir Pardey Lukis occupied the post of Director General of IMS for eight eventful years. He was very closely associated with IRFA since its inception. As Chairman of Scientific Advisory Board and Member of the Governing Body of the Association, he was ever the moving spirit of its activities in which he always took keen interest. Work done during that period of time formed the basis and laid foundation, for what was achieved in later years to improve the health of the people.*

### Expansion of the Research Activities of the IRFA

An important development almost on the close of the first world war was the initiation in 1918 of what was then called 'Beri Beri Enquiry' at Coonoor, South India under the able guidance of Sir Robert McCarrison which ultimately blossomed in to an important laboratory devoted to nutritional research (*Nutrition Research Laboratory*). Notable among the other enquiries started by the IRFA after the war were the 'Quinine and Malaria Enquiry' under Major Sinton, at Kasauli, the 'Kala-azar Ancillary Enquiry' with Major Knowles and Dr Napier, and research on Indigenous Drugs under Col. R N Chopra at the School of Tropical Medicine, Calcutta (now Kolkata).

Realizing that the rules of the Association were unduly restrictive in as much as they referred only to communicable diseases, the GB decided to extend the scope of the Association to research on other diseases as well. Association decided to extend financial assistance to the tune of approximately 25 per cent of the maintenance cost of the School of Tropical Medicine, Calcutta which was just then brought in to being. As the activities of the Association were thus getting revitalized, there came the axe of the Inchange Committee. This committee also known as the Indian Retrenchment Committee appointed to advise the GOI on the scope for economy, because of financial stringencies imposed by conditions in post war period, made certain recommendations which also affected the activities of the Association adversely<sup>4</sup>. The Beri-Beri Enquiry at Coonoor was closed down. A more important outcome, as a result of the steps taken to implement the recommendation of the Retrenchment committee, was the holding of a Research Workers Conference. The first **All India Conference of Medical Research Workers** was held in the autumn of 1923 and opinion were expressed that research programmes should be continued and later it was made an annual event. The year 1926 also marked an important milestone in the history of the IRFA since it received its first contribution of a sum of Rs.1 lakh from the Maharaja of Parlakimedi.

Research on nutritional disease was resumed at Coonoor by Col McCarrison in 1925 under a more comprehensive title of 'Deficiency Disease Enquiry'. Governing Body of the Association converted this Enquiry in 1929 in to a "Centre of Nutrition Research" with Col. McCarrison as its first Director. The "Kala-azar Ancillary Enquiry", financed by the Association, which led to the appointment of a kala-azar Commission by GOI in 1924 made appreciable progress and terminated

### Enquires established Under IRFA

With the beginning of 20<sup>th</sup> century and to deal with the health problems faced by Indian citizens the IRFA was established and many initiatives were undertaken including the setting up of many enquiries by the IRFA to work on specific disease conditions during 1913-1920.

- Goiter & Cretinism Enquiry
- Beri-Beri Enquiry
- Deficiency Disease Enquiry
- Quinine and Malaria Enquiry
- Kalazar Ancillary Enquiry
- Research on Indigenous Drugs
- Research on Nutrition Disorders

Many of the enquiries were later converted or amalgamated to full fledged Research centres under the auspices of the ICMR

### Awarding Medical Excellence

Col Amir Chand in 1953 donated Rs. 53000 to ICMR and this led to starting of Award and Prizes scheme of ICMR to reward medical excellence. At present Council offers 37 awards in different discipline of medical research which also includes 11 awards for young scientists and scientists working in under developed areas and scientists belonging to under privileged community also. Dr B. R. Ambedkar award of Rs.1 Lakh is the highest award of the ICMR given to a senior scientist who has excelled in any chosen area of biomedical research over the period of time.

### IJMR- A flagship Journal of ICMR

A new era in biomedical research was started in the year 1913, when *Indian Journal of Medical Research* (IJMR) was started. Sir Pardey Lukis, the Director General, IMS was the first Editor of the IJMR. In fact, during those times when India was reeling under the ravages of many a life threatening diseases and when medical research was gradually getting momentum, there was no journal to disseminate the scientific knowledge. Most of the work carried out in India was being published in British journals. With the beginning of IJMR top quality medical research was started being published in India and even today after 100 years of its history it still remains the top most medical journal not only in India but probably in Asia and has maintained high quality of all global standards.

in 1930 due to decline of the disease. Another important development was the fruitification of the well drawn plans of Lt Col S R Christophers for creation of a **Central Malaria Bureau** at Kasauli and the **enquiries on Quinine and Malaria and Indian Culicidae**. As part of the project, an experimental **malaria station at Karnal** which was appropriately called after Ronald Ross was also established. Towards the end of 1928, the Rockefeller Foundation made a donation of 648,000 pound to the IRFA for the said institute of **Hygiene and Public Health**. By 1932, the GB of the Association completed the task assigned to it by building up the Institute of Hygiene and Public Health at Calcutta (now Kolkata).

**Malaria Survey of India** was established in 1927 and was supported fully by the finances of the IRFA. Work of the great public health utility was carried

out by the Malaria Survey of India. To disseminate research information a journal *Records of the Malaria Survey of India* was started in 1929, which was edited by the Director of the Survey Major J A Sinton. This was the second journal to be brought out by IRFA. The journal continued till 1938 (total 7 volumes). The GOI, in December, 1937 announced to take over of the Malaria Survey of India as regards to its public Health and advisory function were concerned and changed its name to Malaria Institute of India and shifted to Delhi. In March 1938, *Record Malaria Survey of India* was changed to *Journal of the Malaria Institute of India* (total 6 volumes) under the Editorship of Lt Col G Covell (later Major Sir Gordon Covell). In 1947 the journal was given the new name of the *Indian Journal of Malariology* (IJM) and Col Jaswant Singh who was the first Indian Director of the Malaria Institute of India, became the Editor of this journal. The IJM was

known for its high standard at home and abroad. For 16 years it served as the main organ for dissemination of information on malaria and its control. With the spectacular success of malaria control in 1960, there was less interest in malaria research, hence the journal was discontinued in December 1963. Euphoria of success short lived and malaria resurged back in 1970s, with peak in 1976. In 1977 Malaria Research Centre (MRC), an institute of ICMR was started and it revived the IJM in 1981 with Dr VP Sharma, then Director of MRC became the editor of the journal (total 17 vol). In 2003, to widen the scope further and cover other vector-borne diseases (VBD), it was renamed as *Journal of Vector Borne Diseases* and currently Dr Neena Valecha, Director of NIMR is currently the editor of this journal.

One of the most important events in the history of the association was the change in its status. Till then the Association was a government body, its affairs being managed by a GB consisting wholly of government officials. In 1934, the GOI decided that the Association in future should be a local body not administered by Government, thus rendering it greater freedom in administering funds placed at its disposal. The Memorandum of the Association with its rules and regulations was then prepared in consultation with different departments of the Govt and the Association was registered on 22<sup>nd</sup> March, 1938 as a local body not administered by Govt under the GOI Act No. XXI of 1860<sup>d</sup>. A course of training in nutrition was instituted at Coonoor in the summer of 1937. The Nutritive value of Indian Foods and the planning of satisfactory diets was prepared and they are still in great demand.

During the fourth decade of the 20<sup>th</sup> century, the transmission cycle of the parasite of Kala-azar was successfully elucidated. Aid was also extended to investigations of emergency nature like the Bengal Famine. A fellowship scheme was launched in 1941. In the post war period the subject of medical research in India was reviewed by the **Health Survey and Development Committee (Bhore Committee)**, which recorded its appreciation of the very useful role played by the IRFA in promoting medical research within the limits imposed by the financial resources at its disposal. It however, drew particular attention to the almost complete absence of organized medical research in the departments of medical colleges, to the lack of facilities for training young alert minds in scientific approach to medical matters and to the throttling effect which routine work of the institutions was having on medical

research. Today, there is hardly a medical college in India which is not sending some research scheme or the other for financial support to the ICMR. Medical research is now no longer confined to a few research institutions.

The committee also recommended that a whole-time secretary should be appointed for efficient management of the varied functions of the Association, an aspect which was considered twice by the GB of the Association but could not be implemented.

After Independence, there were several important changes both in the organization as well as in the activities of the IRFA. The first significant measure was to appoint a full-time Secretary for the Association in the year 1948 and to place in his charge the day-to-day management of its affairs as well as the plans for its re-organization and further development. To coincide with the great changes that were taking place at that time, the IRFA was re-designated as **Indian Council of Medical Research in 1949<sup>d</sup>** with considerably expanded scope of functions and responsibilities.

### Reorganization of the activities of IRFA, its evolution as an apex research body with mandate of reaching to the people under the new name ICMR

The Indian Council of Medical Research (ICMR) is today the apex and premier medical research organization in the country for the planning, formulation, coordination, implementation and promotion of biomedical research. It is one of the oldest medical research bodies in the world and is completing 100 years of its existence this year on 15<sup>th</sup> November 2011.

#### The logo of ICMR



(परीक्ष्यकारिणो हि कुशला भवन्ति)

**THOSE ALONE ARE WISE WHO ACT AFTER INVESTIGATION**

Charaka, the ancient Ayurvedic physician believed that old or new, "the wise should not accept anything without investigation". Incidentally these wise words of Charaka have been incorporated in the insignia of Indian Council of Medical Research

Soon after independence, ICMR set-up new research centres to expand research opportunities.

Madras Chemotherapy Centre owes its inception to the technical and financial help given by WHO. The



Cholera Research Centre, Kolkata was created to study various aspect of cholera problem. With the creation of separate organization to deal with the National Malaria Eradication Programme, the Govt of India converted Malaria Institute of India to National Institute of Communicable Diseases to deal with many problems in that field. GOI also established 2 other institutes for Tuberculosis in Banaglore and the Leprosy Research Institute in Madras.

The first unit under the ICMR was clinical Research Unit, established in 1945 in the Indian Cancer Research Centre, Bombay. Since then new units were added to study special problems such as anaemias, liver diseases, diseases of the nervous system and so on.

In 1951, when the first Five year Plan was to begin, the Council did set about establishing an institute for virus research in Poona *i.e.* Virus Research Centre. The Council collaborated and continued to collaborate with the Rockefeller Foundation in running the Poona Centre devoted to research in virus diseases. Apart from Virus Research Centre, the Council continued to maintain the Nutrition Research Laboratory which originally started as Deficiency Disease Enquiry under McCarrison. Later, the Institute was shifted from Coonoor to Hyderabad with enhancement in the scope of its activities.

It will be recalled that in the days of IRFA most of the research was done by a small band of workers belonging to the **Medical Research Department** with the progressive increase in the number of ad hoc enquiries there has been an increase in the number of research workers employed by IRFA but most of these person were employed on temporarily basis. The ICMR succeeded in bringing about a security of service to an increasing number of its workers. The workers at the **Nutrition Research Laboratories** were placed on a more or less permanent footing since 1947. Similarly those employed in VRC from 1952 enjoyed the permanent status. Around 1940, the IRFA embarked on a training programme by awarding research fellowships to deserving medical and science graduates for training under competent guidance in research institutes, medical colleges and universities.

The establishment of the Blood Group Reference Centre in Bombay in 1956 by the ICMR was one of its many activities in as yet un-chartered fields. In order to make available to research workers in the country copies of papers from journals which were not easily accessible, the ICMR also established two microfilm and photocopy service units –one at the CRI, Kasauli

and the other at Indian Cancer Research Centre, Bombay.

In the decade of 1970s malaria resurged back and reached a peak of 6.4 m cases in 1976. ICMR started Malaria Research Centre (MRC) in 1977 and Vector Control Research Centre (VCRC) at Pondicherry to study the disease epidemiology and develop alternative methods of vector control. During 1980s, chains of Regional Medical Research Centres (RMRCs) were opened in different parts of the country to address the regional health problems. During 1980s, HIV/AIDS attracted attention of the global scientific community and ICMR also accepted the challenge and set up a new institute *i.e.* National AIDS Research Institute (NARI), Pune to work on various aspects of the HIV/AIDS. Recently 2 new institutes *viz.* National Institute for Research in Environmental Health (NIREH), Bhopal and National Centre for Disease Informatics & Research (NCDIR), Bangalore have also come up to deal with the problems of Environmental Health and Disease Informatics respectively. With the establishment of a Department of Health Research in 2007 the responsibility of ICMR has also multiplied manifold as the DG ICMR is now also the secretary of DHR. While, ICMR is involved in knowledge generation, DHR takes this knowledge to translate in to products and processes for the benefit of the society.

ICMR was constituted as an autonomous organization with the Union Health Minister as President of its Governing Body. A scientific Advisory Board comprising eminent biomedical experts assist the ICMR in scientific and technical matters. The council promotes biomedical research in the country in intramural mode through a net work of its 32 institutes/centres including 6 Regional Medical Research centres (RMRCs) located in different parts of the country and supports extramural research through grants-in-aid adhoc projects/fellowships in non-ICMR institutes/medical colleges/Universities and NGOs etc. Extramural research is also extended through Centre for Advanced Research, Task Forces, Centre of Excellence and networks like National Nutrition Monitoring Bureau (NNMB), Human Reproductive Research Centres (HRRCs), Integrated Disease Vector Control (IDVC), Units, National Cancer Registry Program etc.

An excursion in the early history of ICMR reveals, that it had continuously struggled its ways through hardships and impediments during early part of the 20<sup>th</sup> century. Whenever, favourable conditions made



## Golden Jubilee of ICMR

Golden Jubilee of ICMR was celebrated in November 1961, when it completed 50 years of its existence. On the occasion a seminar on Cardiovascular Diseases was organized by the Council. Dr Sarvapalli Radhakrishnan, then the Vice President of India inaugurated the Golden Jubilee celebrations of the Council held on 18<sup>th</sup> December, 1961 at Sapru House, New Delhi under the distinguished Presidentship of the Union Minister for Health, Shri D P Karmarkar. Vice President advised medical men to interest themselves in research on three Cs-Cancer, Cold and Contraceptives. The Golden Jubilee function was marked by the presentation of Col. Amir Chand Prizes. Dr CG Pandit, Director, ICMR in his welcome address informed that to mark the occasion, the Council has brought out a souvenir with the caption “Indian Research Fund Association and Indian Council of Medical Research 1911-61- Fifty years of Progress”. He pointed out that brochure describes its genesis, growth and development, the policies and the changing pattern of its working throughout the period and contributions it has been able to make for the advancement of knowledge in the broad field of medicine. The Union Health Minister in his foreword to the Souvenir, paid glowing tributes for the splendid work done by all those concerned with the organization by stating ‘Because of the solid foundation laid by them, it has been possible for the organization to develop in its present stature. From its early efforts, dealing with problems like malaria, cholera, kala-azar *etc*, the Council has branched out in to fields not only of communicable Diseases but also others of equally vital importance. As part of the Golden Jubilee Celebrations, the ICMR organized a seminar on Atherosclerosis and Ischaemic Heart Disease at Council Hqrs from 19-21<sup>st</sup> December, 1961. In its introductory remark Shri D P Karmarkar described the genesis of IRFA and praised the activities performed by the Association. He informed that in last 50 Years many noteworthy advances to the knowledge of medical sciences were made by the workers of this organization in India and cited the names of Christophers, Sinton, Covell, Jaswant Singh and many others, whose contributions in the field of malaria made it possible for the Govt of India to undertake National Malaria Control Programme and National Malaria Eradication Programme. In the field of kala-azar, Shortt, Brahmachari, Swaminathan and numerous others made very significant contributions. Semple was responsible for suitable vaccine for prophylaxis against rabies. The problem of Plague was thoroughly investigated. In the field of nutrition pioneering work of Col McCarrison and Dr Aykroyd and Patwardhan is praiseworthy.

The Fletcher Committee, which reviewed its working, recorded that ‘notable practical triumphs have been won in India and through India for the world’. The Bhore Committee commended the work carried out under the auspices of the association despite of many hurdles. On the occasion, Dr RN Chopra also gave lecture and described how research activities were promoted by the IRFA. He pointed out that earlier Indian were considered not very research minded particularly in the field of medicine and Grants for such work, therefore went chiefly to members of IMS, mostly working in such research institutions as in Kasauli, in Guindy and Haffkine Institute, Bombay. Gradually more and more Indians joined the service and independent medical profession became greatly interested in research also. The IRFA, then started the Research workers conference, with a view to further dissemination and nationalization of research activities in all branches of medicine. Thus the conference became an annual function of great importance for research workers. He also described the growth and expansion of indigenous Indian drugs, foundation for research on the same was truly laid by the ICMR. Message was also received from Dr Jivraj N Mehta, Chief Minister, Govt of Gujarat. He suggested that research should be brought down to teaching medical institutions and not built up in ivory towers in hill top. He also narrated about the research fellowships and explained his experience how he fought for the authorship issue and streamline it. He felt that Council will continue its broad policy of furthering research in medical colleges in the years to come.

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IRFA was established in November, 1911, largely due to the wisdom and foresight of Sir Harcourt Butler, the first member, Department of Health, Education & Lands of the Viceroy’s Executive Council and Sir Pardey Lukis, the then Director General, Indian Medical Services

themselves felt, there came in its ways either a war, a retrenchment, an economic depression or some other interference even than it worked hard towards its desired goals. Although better conditions prevailed after independence, leading to a steady expansion of its activities and provision of certain basic amenities for continued furtherance of medical research. Over the years, it has emerged out as a premier medical research organization in the country.

### **Diseases Prevalent in Pre-independent India and Action Initiated**

When the British Empire came in to power, in India they faced the challenge of a new set of diseases that were endemic in those times. India being such a vast country with environment ranging from worlds highest mountain to plain green fields and from tropical forests to barren deserts coupled with diverse geographical landscape and vivid tribes, culture and practices posed serious challenge with its own peculiar diseases, which were difficult to prevent with limited resources of the IMS. Epidemic diseases that had devastating effects during that period were plague, leprosy, cholera and malaria and great amount of work was done to prevent these diseases. Hence, public health services were strengthened in later years. The initiatives were made to understand the etiology, epidemiology and design effective control measures for the following most predominating diseases of public health importance.

#### **Malaria**

Fever was one of the leading causes of deaths in India. The situation worsened in the early 19<sup>th</sup> century. The major contributing factor was the Malaria which was rampant in all over the country and in many tracts was a scourge far greater than either plague or cholera. According to an estimate in 1935, over 100 million people suffered from malaria every year and over a million died. It caused more sickness, misery and deaths than any other single disease. One of the contributing factors was the establishment of railways and irrigation networks in British Govt. of India, without keeping in view the provision of efficient drainage system for floods and rain waters. This created enormous breeding sites for mosquitoes to breed and proliferate profusely. As far back as 1845, Dempster introduced spleen rate as a measures of malaria endemicity. Around the middle of 19<sup>th</sup> century, cinchona plantation was introduced in India in 1887 a new method of manufacturing pure quinine sulphate was discovered. Later Christophers enunciate the principles of species sanitation. A central Malaria Committee was appointed to study the real

nature of the problem in India on the principles laid down by the Royal Commission on Malaria with regard to techniques of blood examination, spleen surveys and definition of endemicity *etc*<sup>4</sup>.

Surgeon Major Sir Ronald Ross joined IMS in 1881. His landmark discovery on the role of female anopheline mosquitoes in transmission of malaria in 1897 opened new horizons in malaria research and shaped the malaria control program in new direction. In 1902 GOI invited the Malaria Committee of the Royal Society to India. Early experiment at anti-larval sanitation between 1902 and 1909 at Mian Mir, a Military Cantonment, near Lahore in Panjab (now in Pakistan) were started. In 1929, the League of Nations Malaria Committee carried out an inspection tour of India at the invitation of GOI. Institutional level malaria research in India was initially conducted at Central Research Institute (CRI), Kasauli and was sponsored by IRFA. Besides army Cantonment (such as Mian Mir) anti-larval sanitation was attempted at mines and plantations. The Imperial Conference on malaria in Shimla in 1909 led to the formation of Central Malaria Committee to direct the course of anti-malaria operations. In 1930, the Ross Institute in Putney, which was supported partly by India Tea Association in London, opened a branch in Shillong in North East.

On other hand, in 1900, Christophers, Stephens and James conducted detailed research on mosquitoes in military cantonment in Punjab. All India Malaria Conferences (1900-1909) and Punjab Malaria Surveys (1909-1911) were carried out under the supervision of Christophers. In 1909, the Central Malaria Bureau was formed in Kasauli for malaria control and investigation. Charles A. Bentley studied the causes and prevention of malaria in Bombay in 1911. Malaria was a major problem in Punjab. After initial work of Christophers, the Punjab Malaria Bureau carried out detailed surveillance and research on malaria. Chief Medical Officers of Punjab from 1913 to 1918 *viz.*, Capt C A Gill (1913), Lt Col D T Lane (1914), Col H. Hendley (1915-17) and Col R C Macwatt (1918) did extensive work on malaria<sup>5</sup>.

The enquiries of Major Liston and Dr Bentley in Bombay disclosed the fact that malaria did not arise from the swampy surroundings of the city and that the malaria-carrying mosquito was *An. stephensi* which was found to breed in the numerous wells attached to private houses. Major Christophers demonstrated that malaria in Andamans was due to a species of mosquito known as *M. ludlowei* (now *An. sundaicus*), which was found to breed in brackish water of the creek and that the mosquitoes infesting the rice fields

in the neighbourhood are innocuous. Stocking with fish proved utility as mosquito destroyer. Govt of India arranged classes for instructions in practical malaria work twice a year. The Lucknow sanitary conference recommended that a malariologist and engineer should be deputed to Italy to study the methods of 'colmate' and 'bonificazione' under the auspices of the Indian Research Fund Association<sup>3</sup>.

It was at this stage, the IRFA took over this problem and the subsequent history of research in malaria was inseparable from the history of the Association thereafter. The Central Malaria Committee which became a sub-committee of the IRFA pursued studies on the lines defined above till they were interrupted by the first world war. The quinine and Malaria Enquiry under Sinton at Kasauli carried out extensive trials for the efficacy of quinine and other drugs. Enquiries on Indian Culicidae and Anopheline Larvae carried out by Barraud and Puri respectively accumulated important knowledge on the life history of mosquitoes, their breeding habits and habitats. Due to initiative of Col Christophers, the Central Malaria Organization which had been the forerunner of the Malaria Survey of India and the Malaria Institute of India was established and financed by the IRFA from 1927 onwards<sup>4</sup>.

The research on malaria was interrupted due to spectacular success of National Malaria Control Programme (NMCP) of 1953 which later came to known as National Malaria Eradication Programme (NMEP) in 1958 by the use of DDT in malaria control during 1950s and 1960s, but the disease resurged back with vengeance in 1970s and that led ICMR to open Malaria Research Centre (now NIMR) in 1977 to carry out exhaustive research on various issues and give appropriate direction to national programme to control the situation. Recently with the launching of Vector Borne Disease Science Forum this activity has gained further up-scaling and strengthening.

### Plague

Reports of various plague outbreaks in India came in to notice during 19<sup>th</sup> and early part of the 20<sup>th</sup> century. In 1812 outbreak in kutch was reported, that spread to Gujarat and Sindh and lasted for approx. 10 years. In 1828 in Hissar and in 1836 in Marwar, Rajputana Plague was reported to be prevalent. In 1896 epidemic of bubonic plague broke out in Bombay. The plague Commission was constituted in 1896 under the Chairmanship of Prof T R Fraser, Professor of *Materia Medica* at university of Edinburg. The epidemic disease act was passed in

1897. Special powers were given to local authorities to contain and prevent the epidemics<sup>5</sup>. The Plague Research Commission, in 1905 in its investigation thrown light on the etiology and epidemiology of the disease. The chief conclusions were that in India the pneumonic form of the diseases is relatively rare and plague is essentially a disease of rats communicable to man and a few of the lower animals. An epidemic amongst men is directly dependent upon epizootic amongst rats. It was also established that plague spreads from rat to rat and from rat to man through the agencies of the rat flea.

The appearance of plague in Bombay in 1896 and the studies in consequences are of special significance to the development of medical research in India. At that time, except for the fact that the disease was caused by a bacillus, nothing else was known about the mode of the disease or the means for its prevention. The western countries which became apprehensive of the possibility of spread of the disease to their regions, sent Commissions (Austrian, German, Russian and British) to study the problem in India. These Commissions collected much information but did not contribute directly to the solution of the problem<sup>4</sup>. Paul Simond, Waldemar Haffkine and Ernest Hankin made remarkable discoveries, which helped a great deal in elucidation of the disease. Hankin brought forth suggestive evidence that the domestic rat was frequently involved in carrying plague from one place to another. Simond, a French Physician, working in midst of the epidemic in Bombay demonstrated experimentally that rat flea was the vector responsible for the transmission of the disease from rat to rat and from rat to man. Haffkine, developed a vaccine which was shown to confer definite immunity against the infection. The Indian Plague Commission collected a volume of useful information on many facets of the problem, on the bionomics of rats and fleas, the role of blocked fleas in the transmission of the disease and the actual mechanism of transmission of plague from rat to man *etc*<sup>4</sup>. In later years, Plague was controlled. However, a sudden outbreak was reported in Surat in 1990s, but the disease is now under control.

### Cholera

Cholera continued to remain the main cause of mortality. India had the reputation of home of cholera. Epidemics were traced to pilgrims returning from places of religious pilgrimage. Before 1817, cholera was confined to Bengal but during 1817-1821 cholera epidemics in India, shocked the East India Company. By 1830s, cholera was known to be a life threatening



disease to the western world. In India it gained the focus of medical services due to its serious impact on the troops and officers of the company; otherwise it was a disease of the poor people<sup>5</sup>. After the 1868 cholera epidemic in India, the cholera committee was set up to investigate the causes of the disease. The committee concluded that cholera was frequent especially at religious festivals and fairs. Epidemics were attributable to importation of the disease by pilgrims, travelers and troops. Emphasis was given on improving the sanitation. In 1912 Major Greig was deputed to make special investigation of the whole subject that added to knowledge regarding the propagation of cholera and established the fact that not only cholera is convalescent, but healthy persons who have been in contact with cholera cases can act as carriers of the disease and flies may play an important part in the dissemination of infection. In 1960 new type of cholera was introduced in India. The El Tor vibrio, after its successful march from its original home in Celebes, through Hong Kong and the Philippines, reached India during that year and spread to west ward. This pandemic nature created international interest. Other development in this field includes: the development of lab model to study pathogenesis of cholera, development of techniques for its treatment, field trials for cholera vaccine showed good protection for period of 6 months. Researches on cholera have been receiving continued attention of the ICMR for a number of years. ICMR National Institute of Cholera and Enteric Disease (NICED), Kolkata is engaged in studying the various facets of the disease and provide useful solutions.

### Leprosy

Leprosy was a big problem in British India. IMS Medical Officers did enormous amount of research on the scientific treatment of leprosy. After the 1889 Leprosy Bill, the National Leprosy Fund was constituted by the British Empire under the Chairmanship of the Prince of Wales. A Leprosy Commission was formed to investigate the etiology and epidemiology of leprosy. Govt of India passed the All India Leprosy Act in 1898 and Leper Asylums were established in major parts of the country and forcible segregation of Lepers was carried out<sup>6</sup>. In 1881, there were approx.1,20,000 patients with leprosy in India that decreased to 1,02,000 in 1921.

The introduction of Hydnocarpus salts by Sir Leonard Rogers in the treatment of leprosy, during the early decades of the 20<sup>th</sup> century, revolutionized the outlook of medical profession to this dreaded disease. Rogers was instrumental in establishing a **Leprosy**

**Research Department in the School of Tropical Medicine** in Calcutta, which was aided from time to time with grants for research from IRFA<sup>4</sup>. Interest in the problem was revived with the introduction of sulphones in the treatment of leprosy. The Gandhi Memorial Leprosy Foundation was the first to adopt this procedure in 1950 in its anti leprosy work in India. Rogers introduced chaulmoogra oil in the treatment of Leprosy. About 300 million people were at the risk of getting infection. Estimated cases were about 2 and half million. A preliminary assessment was made by the Gandhi Memorial Leprosy Foundation. Leprosy Research Institute and Gandhi Leprosy Foundation were co-operating in assessing the value of diaminodiphenylsulfone as a prophylactic measures. There was evidence that leprosy bacillus was showing resistance to diaminodiphenylsulfone. The Expert Committee of the WHO, and the International Leprosy Congress endorsed later the same approach. ICMR National Jalma Institute of Leprosy and Other Mycobacterial Diseases, Agra has carried out significant research on various aspects of the Disease and is the apex centre in the country to deal with the problem of leprosy.

### Tuberculosis

Tuberculosis had long been recognized as a lethal disease. It was present in India since ancient time especially in lower socio-economic classes, though no proper estimates were available<sup>4</sup>. The problem was serious especially in the large cities. The mortality exceeds that of certain crowded European cities. The difficulties of coping the disease in India were immense and demanded the fullest co-operation between Government and private agency. In 1939, the Tuberculosis Foundation of India was established<sup>5</sup> As there was no clinically effective treatment available for tuberculosis at that time, tuberculosis sanitoriums were formed in hilly areas to provide a healthy environment and segregation. The services of Dr Lankester were secured by the IRFA for the purpose and the research showed that the tuberculosis in India was chiefly human and not bovine in origin. The GOI invited attention to the recommendation of the Lucknow sanitary conference that circumspection should be exercised before instituting at considerable cost. Madras Chemotherapy Centre (now National Institute for Research in Tuberculosis (NIRT) was specifically established to develop domiciliary treatment with drugs commonly in use *viz.*, isoniazid, para amino salicylic acid and streptomycin. Results of Home and sanatorium treatment were quite comparable. In the 3<sup>rd</sup>



five year plan, steps were taken to establish a National Tuberculosis Control Programme.- BCG was already introduced. ICMR has carried out extensive research on epidemiology, diagnostics and management of the disease through its National Institute of Research in Tuberculosis (NIRT), Chennai.

### Kala-azar

Kala-azar was responsible for a significant morbidity and mortality in the provinces of Assam, Bengal, Bihar, Orissa, United Provinces and Madras and in early days was very much confused with malaria. All major contributions to the knowledge of this disease came as a result of the work carried out in the Indian sub-continent<sup>4</sup>. *Nearly, the entire work accomplished on this problem was under the auspices of the IRFA.* In the year 1903, Leishman and Donovan independently discovered the parasite responsible for the disease which is called *Leishmania donovani*. In the following year Rogers demonstrated by culture that the parasite was a flagellate. *IRFA appointed a Kala-Azar Commission* in 1924, some notable contributions were made during the first decade of the Association's activities. In Assam province strange diseases called Kala-azar and Beri-Beri were prevalent. An investigation was carried out by G M Giles, Surgeon IMS on special duty in Assam in 1898 and concluded that disease was ancylostomiasis with slightly different symptoms. In 1899 Sir Ronald Ross, investigated and reported that Kala-azar was an epidemic and communicable disease with symptoms resembling those of malaria except hepatomegaly and splenomegaly<sup>5</sup>. The disease was later proved to be visceral leishmaniasis caused by a protozoan *Leishmania donovani*. Mackie in 1913 working in Assam made a suggestion, for the first time, that the sandfly *Phlebotomus* was worthy of study in connection with transmission of the disease. ICMR's Rajendra Memorial Research Institute of Medical Sciences (RMRI), Patna has contributed immensely in better understanding of the disease and finding new control strategies.

### Filariasis

Filariasis is still the cause of much morbidity and great concern in the country. Efforts of the IRFA were mainly directed to study the prevalence of the disease through surveys conducted in different parts of the country. It was established that the infection was most prevalent along the coastal districts, particularly in the east coast, and the provinces of Bengal and Bihar<sup>4</sup>. IRFA financed studies were conducted at School of Tropical Medicine, Calcutta on the various aspects of

the disease. Govt launched in 1955 a programme for the control of the diseases. All measures including mass administration of diethylcarbamazine, anti-larval and anti-adult measures with use of DDT were adopted. ICMR's Vector Control Research Centre, Puducherry and Regional Medical Research Centre, Bhubaneswar are carrying out exhaustive research on various aspects of the disease and have provided important support to the National Programme.

### Viral Diseases

In the field of virology greatest excitement was seen. With the establishment of Pasteur Institutes in different parts of the country, stimulus was given to the manufacture of rabies vaccine for the prevention of rabies. Interest of the IRFA in rabies dates back to 1911, when Sir David Semple, the first Director of the Pasteur Institute, Kasauli introduced a new type of vaccine for its prevention<sup>4</sup>.

Dengue viruses were first isolated in India by Sabin in 1942.

Influenza was a global problem and as in other parts of the world, epidemics of some severity were reported periodically in India also<sup>4</sup>. The GOI, established in 1950 at the Pasteur Institute, Coonoor, a centre for the continuous study of the virus to collaborate in similar studies with the World Influenza Centre in London established by the WHO.

With the establishment of Virus Research Centre at Pune in 1951, primarily to study arbovirus infections, many diseases of virus etiology came to the light. Though diphtheria, whooping cough, measles and like were always been in the country.

In 1955, reports were received of a virus type of encephalitis from some areas in south India. Investigations revealed – it was due to Japanese B encephalitis virus. It was particularly active in South India and *Cx.vishnui* gr of mosquitoes found breeding in rice fields were incriminated as vectors.

In 1956, episode of infectious hepatitis in Delhi due to sewage contamination of its main water supply is well known. Poliomyelites, investigation was undertaken by Poliomyelitis Research Unit in Bombay.

An outstanding discovery in virology was made in 1957 when a new tick borne virus disease of men and monkeys was detected in the forest areas of Shimoga district in Mysore State. The virus, now called the Kyasanur Forest Disease (KFD) virus belongs to the same group, which also includes the viruses of Russian

Spring-Summer Encephalitis in USSR and the tick-borne haemorrhagic fever in Eastern Europe<sup>4</sup>.

In 1963, first time in India, dengue appeared in Calcutta with typical haemorrhagic manifestation. In 1<sup>st</sup> phase dengue virus was isolated. In 2<sup>nd</sup> phase chikungunya virus was also isolated<sup>6</sup>.

The virus Research Centre (now National Institute of Virology (NIV), Pune) has also carried out investigations and provided technical advise on the epizootic of African Horse Sickness in the country. The disease first appeared in Rajasthan in March, 1960.

Enteroviruses were obviously quite prevalent in the country and some of them were suspected to produce outbreak of encephalitis in children. One such outbreak in 1954 assumed serious proportions in Jamshedpur city and was described in the lay Press as a 'Mystery Disease'<sup>7,4</sup>.

ICMR National Institute of Virology, Pune is the apex nodal institute in the country to deal with the problem of viral diseases and has successfully handled the situations arising recently due to outbreaks of H1N1, SARS, dengue, chikungunya *etc.*

### Infant Mortality

Infant mortality was a serious problem in the beginning of 20<sup>th</sup> century. In 1911 of 4,752,152 male children and 4,457,551 females born in India, 1,016,823 males and 873,677 females died. In other words one-fifth of the new born children died within the first year of their life<sup>3</sup>. In Bombay, an interesting experiment was started by Dr Turner in the form of lectures to the midwives. Under the auspices of the IRFA it was proposed to train two nurses to work as health visitors.

### Urban Sanitation

Urban sanitation received much attention in late years particularly in terms of conservancy, water-supply, drainage and town planning with improvement of housing and relief of congested areas. The emphasis was given to reduce the population of flies as they were disseminators of many diseases including cholera, enteric fever, tuberculosis, dysentery and diarrhoea and largely responsible for high infant mortality. The All India sanitary conferences at Madras and Lucknow drew prominent attention to the danger to health caused by the presence of these noxious insects and the results of the anti-fly campaign at Delhi suggested that a large reduction in the number of flies is by no mean an impossible task. Water supply and drainage also received much attention.

### Pilgrim Centres and Pilgrimages

Pilgrimages results in collection of large number of persons, often more than a million at one place at one time, had an important sanitary aspect mainly in connection with cholera and other communicable diseases. The GOI decided to examine the sanitary arrangements at the chief places of pilgrimage throughout India and local Govt were asked to appoint provincial committees for this purpose under the presidency of the Sanitary Commissioner with Govt. of India with a view to formulate practical schemes of improvement. The Govt provided additional grants for the improvement of the pilgrim route to Badrinath and improving the conditions of the pilgrimage to the Hedjaz was also taken in to consideration<sup>3</sup>. Adulteration of food and drugs and town planning and relief of congested areas and rural sanitation were also given importance.

### Health Communication/Education

The claims of hygiene as part of their educational policy were recognized by the GOI in its educational resolution of the 21<sup>st</sup> February 1913. The IRFA decided to establish a central bureau where lanterns and lantern slides, pictures, and skeleton lectures can be stocked for issue on loan. Help of the Municipal Health Officers and medical subordinates attached to traveling dispensaries and by enlisting the sympathies and active help of medical women, private medical practitioners and private philanthropic agencies and persons was also sought. It was suggested that sanitation must begin at home and as Hon'ble Sir Pardey Lukis and Colonel Firth, the former on the civil, the latter on the military side pointed out, there will never be any real advance in domestic or personnel hygiene until the women of the country realize its advantages and necessity.

### Other Diseases

T. G. Hewlett studied enteric fever in 1883 and conducted detailed studies. The sleeping sickness commission (1908-1910) was formed to investigate the cause of the disease<sup>5</sup>. Other significant work were on yellow fever by SP James in 1913 and on Hookworm disease by Maj Clayton Lane in 1914.

Development of nutrition research in India owes a great deal to Col McCarrison whose incessant and devoted efforts in the early years of the IRFA served to outline the nature of the problem in the country and demonstrated its importance in human health. McCarrison's work in the field of nutrition began with the goiter and cretinism enquiry in Kasauli during

## Director-Generals, ICMR



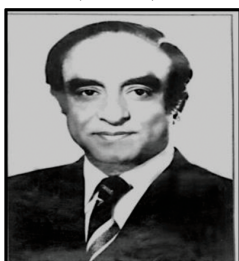
**Dr. C.G. Pandit**  
First secretary  
IRFA & Director ICMR  
(1948-64)



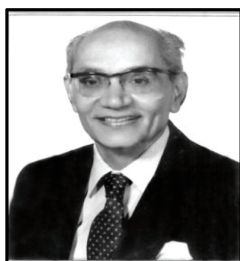
**Col. B.L. Taneja**  
Director- General  
(1964-69)



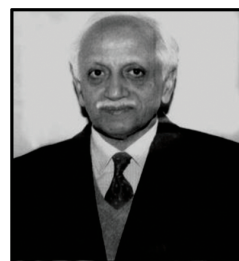
**Prof. P.N. Wahi**  
Director- General  
(1969-74)



**Dr. C. Gopalan**  
Director- General  
(1974-79)



**Prof. V. Ramalingaswami**  
Director- General  
(1979-86)



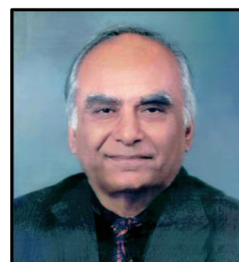
**Prof. A.S. Paintal**  
Director- General  
(1986-91)



**Dr. S.P. Tripathy**  
Director- General  
(1991-94)



**Dr. G.V. Satyavati**  
Director- General  
(1994-97)



**Prof. N.K. Ganguly**  
Director- General  
(1998-2007)



**Dr. V.M. Katoch**  
Director General & Secy., DHR  
(w.e.f. 2008- )

*IRFA: President - Director General, Indian Medical Service; Secretary - Public Health Commissioner*



1913-14. With the generous support from IRFA in 1918 McCarrison started beri beri enquiry in Coonoor and it was converted in 1929 in to a Centre of Nutrition Research. He was designated the first Director of this centre and continued till his retirement in 1935<sup>4</sup>.

Small pox though not a tropical disease but used to be so rife in India as to be associated with among Hindus with its own goddess. Now occupies small place in mortality returns due to spread of vaccination during later half of the century.

### Major Milestones, Specific Contributions and Achievements of IRFA/ICMR

During hundred years of its existence ICMR has contributed immensely in unraveling many intricate medical riddles through its extensive basic, applied and operational research. Many of the research findings of the ICMR have laid basis/foundation for formulating and launching several national health policies and programmes. Some of the landmark discoveries/achievements<sup>7</sup> of the ICMR during its glorious 100 years of history are listed below:

#### Important moments:

- First meeting of the Governing body of the IRFA was held on 15<sup>th</sup> November, 1911 at Plague Laboratory Bombay under the chairmanship of Sir Harcourt Butler.
- At the 2<sup>nd</sup> meeting of the Governing body historic decision was taken to start a journal for Indian Medical Research and this laid the foundation of the *Indian Journal of Medical Research* started in 1913 under the authority of the director General IMS.
- Malaria Survey of India was started by absorbing Central Malaria Bureau at Kasauli and the enquires on Quinine and Malaria and Indian culicidae in 1927.
- Experimental Malaria Station was set up at Karnal as part of Malaria Survey of India in 1927.
- The publication of *Record Malaria Survey of India* was started in 1929 later renamed as *Journal of the Malaria Institute of India* in 1938 and subsequently became *Indian Journal of Malariology* in 1947, which has now been renamed as *Journal of Vector Borne Diseases* in 2003 to broaden its areas to cover other vector borne diseases as well.
- IRFA was registered as a local body not administered by the Government on March 22, 1938 under the Government of India Act No. XXI of 1860.
- The Malaria Survey of India was re-designated as the Malaria Institute of India.
- A research fellowship scheme was started by IRFA in 1941.
- Transmission cycle of Kalazar was elucidated by Swaminathan, Smith, Shortt and Anderson.
- Dr C.G. Pandit was appointed as the first full time Secretary of IRFA in July 1948.
- IRFA was re-designated as Indian Council of Medical Research with Dr C.G. Pandit as its first Director in 1949.
- A new blood group, the Bombay group was discovered by Dr H M Bhatia and colleagues in Bombay in 1952.
- The ICMR Received a generous grant of Rs. 53000/ from Col Amir Chand for instituting a system of Prizes and Awards for good research work conducted in India in the field of Medicine in 1953.
- ICMR Hqrs moved in its new building in Ansari Nagar in 1960.
- Col B.L. Taneja took over as the Director of ICMR in 1964. The post was re-designated as Director General, ICMR in 1966.
- The ICMR permanent research cadre of scientists was established in 1965.
- Prof. P.N. Wahi took over as the Director-General of ICMR in 1969
- The WHO-ICMR Unit on Genetic Control of Mosquitoes was established in 1970.
- ICMR Bulletin the in-house periodical of ICMR was started in May 1971.
- Dr C. Gopalan took over as the Director General of ICMR in 1974.
- Prof V. Ramalingaswami took over as the DG of ICMR in February 1979.
- National Cancer Registry project was started in 1981.
- *Indian Journal of Malariology* which was discontinued was revived by MRC(NIMR) in 1981.



- Post of Additional Director General was created in the ICMR Hqrs and Dr S Sriramachari took over as the first Addl DG of ICMR.
- Smt Indira Gandhi the Prime Minister of India visited ICMR on 22<sup>nd</sup> April 1983 and held discussion with senior scientists of ICMR.
- The Five yearly assessment scheme for ICMR Scientists was initiated in 1983.
- Prof A.S. Paintal took over as the Director General of ICMR in September 1986.
- ICMR Patrika was started in July 1986.
- A field unit of NJILOMD for epidemiology of Leprosy was established at Avadi in Tamil Nadu in 1988.
- First Dr. B.R. Ambedkar Award for Excellence in Biomedical Research instituted by ICMR in 1991-92 was announced in 1994.
- Dr G V Satyavati became the first women Director General of the ICMR in 1994.
- Shri H. D. Dev Gowda Hon'ble Prime Minister of India launched the concluding ceremony of the 85<sup>th</sup> year of ICMR on October 15, 1996 at Vigyan Bhavan, New Delhi.
- Dr N K Ganguly took over as the Director General of the ICMR in 1998.
- ICMR Junior Research Fellowship was started in 2002.
- Department of Health Research (DHR), was set up in 2007 and the Secretary DHR also became the DG, ICMR.
- NIREH and NCDIR, set up in 2010 & 2011 respectively.
- The National JALMA Institute for Leprosy and other Mycobacterial Diseases (NJIL&OMD), Agra is responsible for the council's main research activities on chemotherapy, immunology, pathology and biochemistry of leprosy. The main thrust of research in the area of leprosy now is to reduce the infection load in the community by introducing effective multi-drug therapy (MDT) and testing appropriate vaccines against leprosy.
- The concept of multi-drug therapy for leprosy was also field tested and evaluated. Pulsed rifampicin administration was observed as good as daily or intermittent administration. A MDT regimen supplemented with one year pyrazinamide administration has been found to have effect on persists and subsequent faster bacteriological clearance. A MDT of longer duration for patients not responding to six months regimen has been recommended.
- A Mycobacterial Repository Centre has been established at NJILOMD, Agra.
- National Institute of Cholera and Enteric Diseases (NICED), Kolkata has been designated as the WHO Collaborating Centre for Research & Training in Diarrhoeal Diseases in 1980.
- The demonstration of oral rehydration could prevent mortality due to diarrhoeal diseases was an important milestone.
- Home available fluids (HAF) such as Sherbat (salt, sugar, lemon, either singly or in combination) or tender coconut water, pressed rice water has been found to be equally effective and more acceptable than oral rehydration solution (ORS).
- A new toxigenic strain of *Vibrio cholerae*- *V. cholerae* 0139 – was detected and characterized and its epidemiology elaborated. A new phage typing scheme for *V. cholerae* biotype Eltor strain has been developed.
- An enteroaggregative *Escherichia coli* (E AggEC) has been isolated as possible etiological agent of acute diarrhoea among children in Kolkata.
- The emergence of rotavirus causing diarrhoea in adults in Kolkata is a new phenomenon. The group B rotavirus resembles the Chinese adult diarrhoea rotavirus (ADRV) strains in electrophoretic profile. An immuno-diagnostic kit was developed for diagnosis of rotavirus infection.

#### **Scientific Achievements/Contributions:**

- The efficacy and safety of short course chemotherapy (SCC) in pulmonary extra-pulmonary and multi drug resistant (MDR) forms of affliction in adult and childhood tuberculosis by Tuberculosis Research Centre (Now NIRT), Chennai.
- The TRC, Chennai demonstrated that supervised administration of anti-TB drugs twice weekly is as efficacious as daily administered treatment. The directly observed treatment short course (DOTS) is currently a globally accepted programme for control of Tuberculosis.

- *Vibrio parahaemolyticus* strains belonging to top serotype 03 IC6 emerged in Kolkata. The strain was studied by restriction fragment length polymorphism (RFLP) and pulsed field gel electrophoresis.
- Cell culture from mosquito (*Aedes albopictus*) tissues was established for the first time at NIV, Pune.
- Kyasanur forest disease (KFD) in the Sagar Soraba area of Shimoga district in Karnataka was discovered in 1957 by Scientists of VRC. Vaccine against KFD was prepared.
- ICMR demonstrated the presence of HIV infection in India and initiated country-wide sero-surveillance.
- Studies carried out by the ICMR led to the detection of HIV epidemic in injecting drug users in north-east India.
- Extensive field, basic and applied research resulted in recognition of malaria paradigms in the country.
- Sibling species in malaria vectors were detected which has helped in malariogenic stratification of the country.
- Malaria Parasite Bank was established at NIMR, New Delhi.
- Bioenvironmental methods of malaria control as an alternative to insecticide based approach were developed and applied in different eco-epidemiological zones of the country which proved cost effective, sustainable and eco-friendly.
- Community based integrated vector management programme achieved significant reduction in vector density for the control of filariasis in Cherthala, Kerala.
- Biological control of mosquitoes through biocides using *Bacillus sphaericus* and *Bacillus thuringiensis* and larvivorous fish such as Guppy (*Poecilia reticulata*) and Gambusia (*G. affinis*) was demonstrated.
- Direct Agglutination Test (DAT) was established as early diagnosis for Kalazar.
- Leptospirosis was studied extensively by RMRC, Port Blair.
- Health problems of the tribals were identified and studied by the RMRCT Jabalpur, RMRC, Port Blair and other ICMR Institutes.
- ICMR established a network of contraceptive Testing Units in 1971 later renamed as the Human Reproduction Research Centres (HRRCs) in 1980. HRRCs were involved in carrying out multicentric clinical trials and pre-programme introduction studies to evaluate newer contraceptives for their possible use in the programme.
- A low cost high sensitivity test for pregnancy was developed.
- ICMR has prepared the guidelines for Assisted Reproductive Technology (ART).
- A chain of Regional centres of National Nutrition Monitoring Bureau (NNMB) was established in 1972. NNMB continuously provided national data on dietary intake and nutritional status of population group from different parts of the country.
- National Cancer Registry Programme (NCRP) set up in 1982 has provided long term community based data on the occurrence of various types of cancers in India.
- *Jai-Vigyan* mission mode project on RF/RHD was initiated.
- ICMR studies demonstrated safety, efficacy and cost effectiveness of *Ksharasootra* for the management of fistula-in-ano and the use of wood of the *Vijayasara* (*Pterocarpus marsupium*) in the control of diabetes mellitus.
- The *Indian Journal of Medical Research* (IJMR) the oldest biomedical journal in India started in 1913 continued to remain the flagship Journal of the ICMR and indexed by the all the global indexing and alerting services. All articles published in IJMR since inception (1913) were digitized and made available in searchable interface.
- IRIS upgraded to Bio-informatic Centre of the ICMR and ICMR-NIC centre for Biomedical Information was identified as Indian MEDLARS Centre and developed IndMED database. Centre is now working on a project titled 'National Database of Indian Medical Journals' and engaged in updating the IndMed and MedInd databases.
- Ethical Guidelines for Biomedical Research on Human Subjects were prepared.
- ICMR started a Junior Research Fellowship (JRF) schemes for the young post graduate students and Short Term Studentship (STS) for medical

graduates to do short term research projects to acquire training and orientation for research.

- Many other studies of the ICMR assisted in formulating the national programmes and policies of the Government of India.
- Clinical Trial Registry of India (CTRI) was established. This is an online system for registration of all clinical trials in India.
- To address the challenging task to give a greater thrust and focus to health research, a new Department of Health Research under the Ministry of Health and Family Welfare was created on 17<sup>th</sup> September, 2007 and the Department was formally launched on 5<sup>th</sup> October, 2007. DG, ICMR also became the Secretary DHR.
- Dr V.M. Katoch joined as the first Secretary of the DHR and Director General ICMR in September, 2008.
- Four flagship programmes *viz.*, Tribal Health Research Forum, Vector Science Forum, Special Support to medical colleges and Translational Research were initiated.
- School of Public health was set up at NIE, Chennai in July 2008.
- New field stations of RMRC Port Blair at Car Nicobar & Nancowry and of NIV Pune at Gorakhpur, UP & Alappuzha, Kerala were established.
- NIMR shifted to its own campus at Dwarka, New Delhi and was recognized as Centre of Excellence in malaria research by NIH, USA.
- Model Rural Health Research Unit of NJILOMD, Agra at Ghatampur developed as a model of partnership with state government for transfer of technology to the end users.
- A network of viral/infectious disease diagnostic laboratories was set up in the country.
- Many of the ICMR Institutes were equipped with BSL-II and BSL-III labs while, MCC, Pune established the BSL-IV laboratory.
- National Tumour Tissue Repository was also set up.
- A new centenary post-doctoral fellowship scheme was launched.
- International fellowship scheme was launched

to provide support to junior and senior level biomedical researchers.

- A real time RT-PCR useful for early diagnosis was developed for the detection of dengue viral RNA.
- A kit for JE developed and supplied for national programme.
- Rapid IgM ELISA and Latex Agglutination Test for Leptospirosis was developed.
- Phase III clinical trial with intravascular injectable male contraceptive RISUG did not indicate any side effect after 2 years of interventions.
- Use of Remote sensing and Geographical Information System was established for assessing the density of malaria vectors.
- Published Cancer Atlas that helped map patterns of cancer.
- Developed magnifying device (Magnivisualizer) for cancer screening in the field.
- ICMR has been actively involved in various epidemic investigations, Health issues arising due to Disasters/natural calamities, Health Impact Assessment of developmental projects such as Konkan Railways and Sardar Sarovar Projects *etc.*, and has given special focus on tribal health issues.

### Vision and Future Challenges

ICMR has traveled a long uninterrupted journey of 100 years and achieved many laurels and recognition. It has helped in shaping the national health destiny by providing solutions to many health problems India faced during all these years and many of the findings of the ICMR research has been useful in formulating the national health policies and cost effective strategies. ICMR is embarked up on to enter in to new XII five year Plan with the coming financial year with new vigour and vitality. On one hand when ICMR successfully crossed many barriers over hundred year of its existence it is faced many new challenges such as emerging and new emerging infectious diseases, drug resistance, outbreaks, mental health, issues of the elderly, climate change and its impact on deteriorating health conditions *etc.* The challenges are many, but with its deep rooted commitment, vast experience of a century and well established net work of well equipped laboratories in nook and corner of the country with trained, dedicated, experienced scientific, administrative and technical man power, it may scale new heights and achieve more laurels and success in years to come.

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This write-up has been compiled and contributed by Dr. Rajni Kant, Scientist E, Division of Publication & Information, ICMR, New Delhi

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