

## A BRIEF HISTORY OF SCIENTIFIC TECHNOLOGY, RESEARCH AND EDUCATIONAL PROGRESS OF SOUTH KANARA, KARNATAKA STATE

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A survey of ancient records regarding scientific and educational progress in South Kanara reveals many interesting details. The available records are grouped into early period and the progress in the 19th century. The latter part is discussed under different headings.

### EARLY PERIOD

During this period the manuscripts of the works of Mahāvīrācārya, the great Jaina Mathematician of the 9th century, have come down in Kannada translations as “*Gaṇita Sāra Saṃgraha*”. This is a work dealing with operations with numbers. *Lokopakāra* written by Cāmuṇḍarāya II (1025 A.D.) is the earliest encyclopedic work in Kannada. It deals with Astronomy, Astrology, Architecture and Horticulture; preparations of perfumes, cooking and medicine; treatment of wounds and fractures; poisons and antidotes and veterinary science. Śrīdarācārya’s *Jātaka Tilaka* (1049 A.D.) treats Astrology and is the first work of its kind in Kannada.

During the 12th century and afterwards the technical works appeared, depicting the contemporary knowledge of the experts in different fields. Many rulers of that period had encouraged the authors of these works who were keen on writing on medicine and other things useful to fellowmen. For example, Kirtivarma’s (1125 A.D.) *Govaidya* describes treatments for the diseases of cattle, Jagaddala Somanātha’s (1150 A.D.) *Karṇāṭa-Kalyāna-Kāraka* a translation of Sanskrit work of *Puṣyapāda* dealing extensively with Āyurvedic medicine. Rājāditya (1191 A.D.) wrote treatises on mathematics such as *Vyavahāra Gaṇita*, *Kṣetra Gaṇita*, *Vyavahāra Ratna*, *Jaina Gaṇita Sūtra*, *Teckodāharaṇa* etc. His work might have served the purpose of text books or of mathematical entertainment in those days. ‘*Rattamālā*’ by Ratta Kavi (1300 A.D.) is a work on meteorological topics such as cloud formation, varieties of clouds etc. Another important work of 14th century is *Khagendra Maṇi Darpaṇa* of Maṅgarāja (1360 A.D.) on poisons and their antidotes.

One of the characteristic features of the above works is that they are in verse and have some literary quality. At a time when there was no printing technology, large

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number of copies of a particular work could not be produced. It was easier for the people to remember the scientific material in verse forms.

#### NINETEENTH CENTURY

With the advent of Western education, Scientific study along the Kanara coast was carried out by foreigners. Portuguese travellers and an Italian traveller (Piyatro Dellavelle, 1623) in 17th Century during their voyage to India have described the geography of South Kanara, its flora, fauna and the life style of the people. A British traveller, Thomas Herbert (1630) on his voyage to West Coast, has given a vivid description of the types of fruits available in this region. Hamilton (1719) in his '*New Accounts of India*' describes the war methodology and ports. A scientific touch was given for these observations through the arrival of German Missionaries and various British military and administrative officers. Some of the officers took up these aspects as a hobby. Record of first bird watching in this part made by Major Pythian Adams. Casimir de Candolle (1836-1918), a Swiss botanist, while surveying for Piper Sp. along the Malabar coast has made the following remarks in his Prodomus in 1869: "Prope urben Mangalore in campis aridis et horleis lerrae cauarae"—which means, *Piper trichrostachyon* was found near the town of Mangalore, in dry fields and gardens of Canara.

In 1801 Lord Marquis of Wellesly appointed Dr. Francis Buchanan to make a comprehensive survey of Canara and Malabar region. Dr. Buchanan with his keen observant power has given a vivid account of the flora and fauna of South and North Kanara in his papers.

John Sturrocks (1894) who was the district collector of Mangalore at that time, has given a detailed description of the natural flora and fauna in his manual. He also adds that nothing was on record to show whether any definite rules of the forest administration were in force under early native Governments; but there are numerous indications that the value of forest, for preservation of springs and supply of leaves for manure was well understood by private owners and later days, Tippu Sultan framed severe rules for the conservation of sandal wood for his revenue and teak for his navy.

In Sturrock's manual it is said that during 1874-1882 regulations to protect certain forest trees were prevalent. Government had earmarked certain areas of forest as 'reserve forest' and nine species of trees were selected as 'most deserving of protection', while 15 less valuable species in unreserved forests were classified as 'classified trees'. They were not to be felled without permission. St. Mary's Island, and Deria Bahdur Ghur, the islands lying north to the port of Malpe is so called on account of a cross set up by Vasco da-Gama who visited them in 1498. We can also find a general account of the flora and fauna, Geology of these islands in this manual. The navigational route, presence of under water ridge and rocks and how to approach the Island etc. are also explained here.

Eventhough this coastal stretch was commercially patronised at one time by Arabs, Africans, Portuguese and the Dutch, the real scientific and technological progress is due to the extensive contribution from the Basel Mission (1934) to which the district as a whole owes its educational, industrial and technological progress. There was no field left unvitalised and unplumbed to its depths of antiquity and profundity by the early Basel Missionaries. It was they who brought to light all the obscure flora and fauna of the district.

### *Education*

Till the beginning of the 19th century there were no schools in South Kanara. The children practised alphabets at home, by writing with their fingers on rice bran or sand spread on the floor. This was followed by writing on slates and finally on paper. In some villages, villagers used to appoint a teacher, designated as 'Aigal' to teach their children. The schools were called 'Aigala Mata'. Though Kannada, Mathematics, History, Geography, Civics and Horticulture were the subjects taught, the first two subjects were stressed. The establishment of the British rule in the city soon led to the enthronement of the Western ideals and ideas. The fascination for western education and the eagerness of the natives to participate in the administration led to the establishment of schools of education for the natives. In such an atmosphere, the Basel Evangelical Mission entered the field of education. The first High School, Basel Mission High School, was established in 1838. A decade later another English School was opened by Catholic Bishop. He placed it under an Irish and French Gentleman. At present it is known as Milagris High School. Slowly, more than 40 elementary and lower secondary schools were scattered all over South Kanara carrying torch light of education to the villages. With the exception of Anglo-Vernacular schools, the medium of instruction in all the Basel Mission Institutions was in vernacular.

In 1858 the Catholics of this area started another school for the education of their 'faithful flocks'. Today this institution is known as Resario High School. Enlightened citizens of that period quickly realized the need of proper education for the natives and in 1865 they memorialized to the government to open a provincial school. Accordingly in 1866 the provincial school of Mangalore came into existence. The first batch of matriculation came out in 1867 from the school and in 1868 F. A. classes were started. In 1879 the name of this provincial school was changed to Govt. College. In 1880 St. Aloysius college was started by Jesuvt Priests. In 1870 St. Annes High School was started for girls. Even at that time separate schools for boys and girls were present, though in many schools co-education was prevalent.

The increased number of schools and the increasing number of pupils necessitated the need for efficient and trained teachers. Hence teachers training schools were started. Govt. Training School, one of the oldest in the west coast, was started in 1890. In the same year St. Annes Secondary Training School came into existence. Prior to this teachers were trained by Basel Missions Teachers's Training School at Udupi. Courses in practical and theoretical lessons, training in the art of instruction and in

some specialized fields were given. Once in a year, these teachers were summoned by the school inspector who gave them practical and theoretical courses of instructions. Basel Missionaries had started different types of schools such as, Anglo-vernacular school, Elementary Day School, Boarding school, Middle schools, training classes and Catechist seminary.

Meanwhile, social reforms were gathering momentum and saw that uplifting the lower strata of society, the depressed classes lay in the hands of education. In 1932, a school for the depressed class children, The Depressed Class Mission School at Kodialbail, Mangalore perhaps, one of the earliest of its kind in S. India, was started by one of the social reformers of the district.

Records of the year 1881-1891 show that South Kanara occupied much lower position in the scale of education of males than the Madras Presidency, while female education was apparently better cared for, than in most districts. Even then, 82.82% of males and 99.02% of females were uneducated. Census statistics showed that education was still backward in South Kanara. However, by the end of 19th century, the number of educational institutions have increased. In 1893, there were 579 institutions of which 468 were public institutions, 111 were private and purely indigenous. Of these, 77 were Quran schools, 21 were elementary vernacular schools, 6 were sanskrit and 7 special schools. Study of Arabic, Hindustani, Latin, Greek, Sanskrit and Malayalam were prevalent.

### *Books*

Tulu is one of the Dravidan Languages. In 1847, the Bible was printed in Tulu language in Kannada script. Rev. Kemmerertr started work on Tulu Dictionary, but he died in 1858. Based on his work, Rev. Manner prepared Tulu-English (1886) dictionary and English-Tulu (1888) dictionary. These were printed and published by the Basel Mission society. In 1872, Rev. Brigel wrote the first Tulu grammar. Rev. F. Kittel was requested by the committee of the Basel Mission society to compile a Canarese Anthology. Dr. Kittel had a flare for lexicography. Decades of patient study of the Kannada language and strenuous search for words and their meanings crystallised into a Kannada-English Dictionary. It took 18 years to complete this work running into 1752 pages and was printed at Basel and Leipzig in 1894. This pioneering effort of Kittel still remains unsurpassed in extent and scholarship.

Canarese school books were published by the Department of Public Instructions. The school book No. 5 was the first of the series and was printed in 1868 at Mysore Press. Later, Basel Mission Press published the remaining 1-4 series in 1882, 1883 and 1886.

Many scientific books were written in the last quarter of the previous century on the subjects like Geology, Land survey, Agriculture, Mineralogy, Zoology, Botany

and Geography. Some of them are translations of English books whereas others were written only in Kannada. A few books in the form of objective lessons were meant for elementary schools, wherein, common animals like cat, dog, monkey, elephant and plants like tobacco, sugar cane, rice etc. were described in detail with figures irrespective of the scientific groupings.

An important book in Botany entitled, *Glimpses into the Life of Indian Plants—An Elementary Indian Botany* was written by Rev. J. Pfeleiderer and it was published by Basel Mission Press. This book was read by the pupils all over India. *Zoology of Indian Animals* is another book. These books were translated into Kannada too. *A First Book of Agriculture* written by C. Benson and C. K. Subba Rao contained the chapters giving details of agriculture such as seasons, common crop, types of cultivation etc. The 4th edition of this book was brought out in 1898. The earlier editions could not be traced by us.

Gordon S Forbes, a collector of this district wrote a book entitled, *Wild life in Canara and Ganjam*. Unfortunately, we could not trace this book.

### *Art of Lithography*

Basel Mission from its early days in Mangalore specialised in typography. Two of the European superintendents of the press invented a unique printing process. Serving in India for only for a year or two, both of them left the country with the process undivulged to others. An illustration of their work is found in Rev. J. Hunziker's book. While working at Mangalore, he made very significant contribution by bringing out a rare work, in Kannada *Hindustanada Moolika Nidarshangalu* or also entitled *Botan Autography* or *Nature's self Printing of the South Indian Flora* in 1862. This is a pictorial book of plants and leaves printed in natural colours. The technique adapted was very unique and the author explains as follows : 'The young plants with roots were preferred and collected instead of branches or leaves. The natural oil colours are ground well. The plants are chosen and the appropriate natural colours are applied on the leaves. Using this plant, a coloured plate can be prepared on a plate. The coloured plate thus prepared has to be printed on a paper. By this means, one can produce only one or two prints. Again, take another plant and repeat the process'. As these processes take much time, the copies of the book prepared was very less. The plants around Mangalore, a few plants from the West coast and also a few from Ooty were collected and 474 coloured pictures of leaves belonging to about 440 species of plants were prepared in two volumes (26×36 cm.). Of these, two pictures are of special significance since they were weaved like mats. A variety of useful and decorative plants, shrubs, trees, vegetables and ferns etc. are represented in these volumes. On the lower side of each picture, name of the plant is given in Kannada, Tulu, Konkani and wherever equivalent names are available in Sanskrit, English and also in German languages.

### *Medicine*

Messers Pflcbst & Stolz, two agents of Basel Mission, initially recorded about 1874 species of plants with their vernacular and scientific names, the time of flowering, the habitat, medicinal properties and common uses in *Canarase Almanac*. Subsequently, in 1881 they brought out a book in Kannada entitled, *Sahasradha Vrakshadigala Varnane* (Five hundred Indian plants and their uses in medicine). It had a very great demand. K. M. Nadkarni, an Āyurvedic physician has recorded his personal observation of marvellous effects of Āyurvedic medicine in curing patients in his compilation of 15 years of experience entitled, *Indian plants and drugs* (1908). Even today, the revised edition of this book entitled *Indian Meteria Medica* is highly useful for the brethren of medical profession and public in general. This book gives therapeutical properties of numerous remedial drugs and agents of indigenous origin. It also provides the composition of several diatectic articles such as fruits, grains, vegetables etc., thereby helping in prescribing diets.

Fr. Muller, a German Jesuit Missionary came to India in 1878. He was a teacher in St. Aloysius school and was engaged in charitable work. He had a good faith in Homeopathy. He started experimenting Homeopathic medicine on his students and their parents. The response was so enormous that in 1880, he had to open a small dispensary at Kankanady, Mangalore, where he started his own Homeopathic preparations, known as 'Fr. Muller's Specifics'. These products still have a great demand all over the world.

### *Agricultural Technology*

According to the *Imperial Gazetteer*, the agricultural practice during 19th century was not dependent on the knowledge of books but was based on the traditional experience of decades and centuries suited to each type of land.

When water for irrigation could not be obtained by direct flow, lift irrigation was practised by primitive contrivances. In cases where lifting was to be done by only a few inches, water was thrown up by means of a small wooden scoop held in hand. A somewhat larger scoop was suspended from a small tripod and called *Kaidanmbe* was used for lifting over 1-3 feet. A more efficient method of lifting was to have two men to scoop water up with a basket suspended on two ropes one of which was held by each of them. When the water was at a greater depth, a *yatham* was used. Here, the lever was pulled down by men hodling on to ropes and dropping into a pit. By the side of the pit, there was an inclined plane and they walked up again to repeat their jump. These methods are still in vogue in some places of this region where modern irrigation implements are not available.

### *Agricultural Implements*

Following are the names of the agricultural implements used at that time;

1. Plough (for ploughing);
2. *Mattu palai* (for levelling the land before ploughing);
3. *Kudanti* or wooden mallet (for breaking clods of earth);
4. Wooden thrashing frame;
5. Fork (tossing straw);
6. Wooden mallet (packing rice up into 'muras' (package of 84 lbs.) with straw covering);
7. Fork (heaping manure);
8. *Kaipalai* (gathering paddy etc.).

These implements are still used in many parts of this region. Even though these implements look crude and more primitive, they are not ill adapted for puddle cultivation of rice. Attempts by the Government officials to introduce improved methods of cultivation did not meet with much success.

### *Tile Technology*

Tile industry has been one of the staple crafts for many years. Mons claf Tore (1713), a Swedish visitor to Mangalore mentions about the country tiled roofs of these area. The country tiles were prepared by Potters. A specific type of clay which is available in this part is moistened, rounded and moulded into the shape required, mostly in the form of half round, and then baked in oven. Modern tile factory was started in 1864 due to the entry of Basel Mission. The modern tile technology is of very unique in nature. Flat type of tiles with lugs and loops to secure it to the cross battens of the roof was the innovation over the country-made tiles and this made a revolution in the trade and created a great demand for Mangalore tiles and had a good export market. Beautiful flooring tiles with multicoloured designs were being prepared by the Basel Mission Tile factory for some time. But this technique was also not revealed to other workers.

### *Printing Technology*

Basel Mission Press was started in 1841 and it has done a yeoman service to the nation as a whole. One of the admirer had recorded that the press or *chapakhany* when brought first to Mangalore, has sounded most mysteriously in the ears and produced strange thoughts in their minds. When the lithographic press arrived, people of the town came in multitudes to look at the wonderful thing and amazed at the working of it. Hundreds of books on all aspects came out of this press for spreading a sound knowledge. It was one of the few best presses in India at that time.

### *Chemical Technology*

Rev. Fr. Metz of Basel Mission introduced weaving on a commercial scale in 1854. Mr. Hallen, a trained weaving specialist introduced the first handloom with

the fly shuttle in 1851. He was genious in discovering new dyes and colours out of indigenous ingredients. The credit goes to him for the invention of the world famous Khaki colour. Lord Roberts, who visited this weaving establishment at that time was so pleased with this simulation of natural ground colour by the newly invented khakhi colour that his earnest advocacy of its use has made it the everyday uniform of the British army the world over.

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