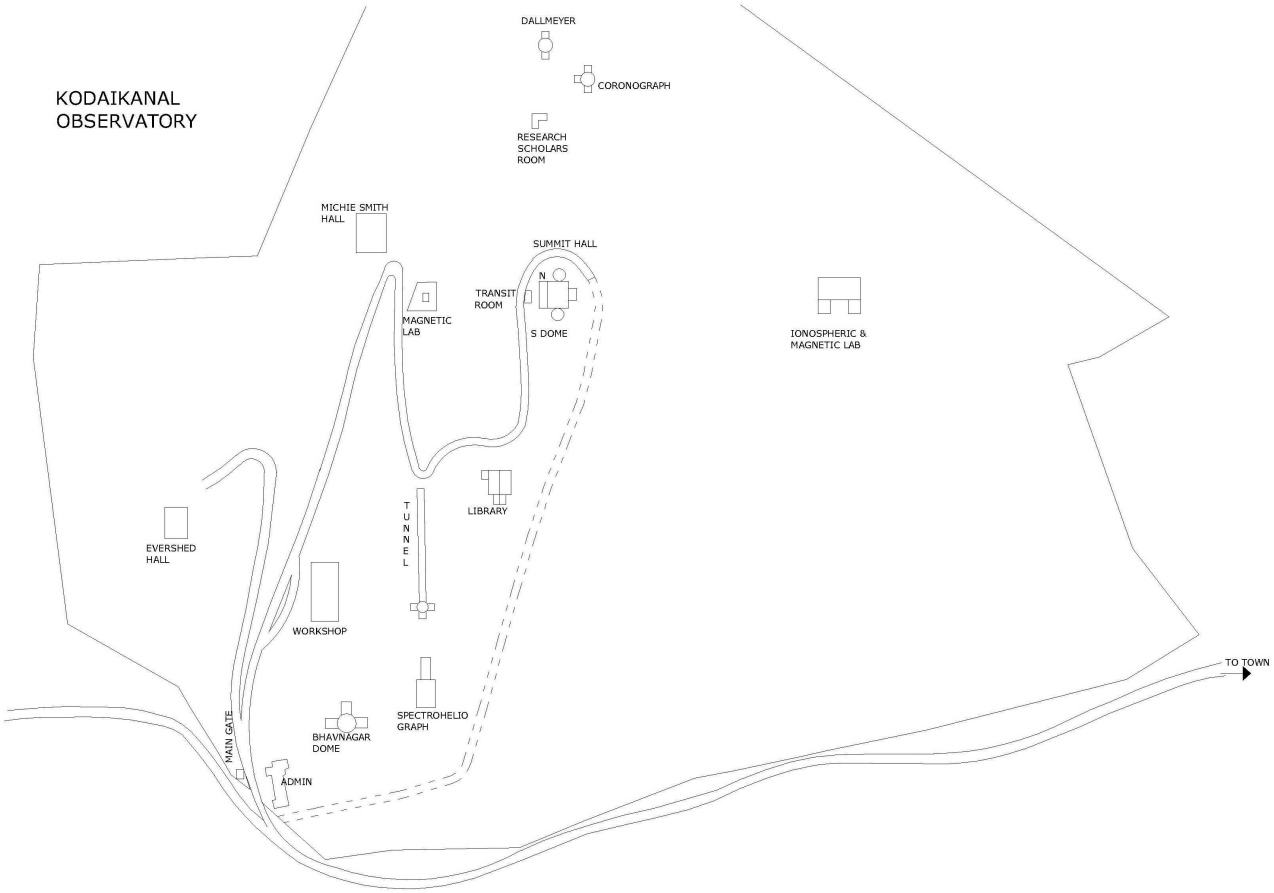

Figure 29.1: *Kodaikanal Observatory, founded in 1899, general plan*

29. Kodaikanal Observatory (1899)

Rajesh Kochhar (Chandigarh, India)

29.1 Introduction

Solar Physics Observatory, Kodaikanal, in Palani Hills (now Tamil Nadu state, India) was formally established on 1 April 1899 as a successor to Madras Observatory which began as a private set-up in 1786. If the twin transits of Venus of 1761 and 1769 led to the institutionalization of modern positional astronomy in British India, the 1874 transit did the same for astrophysics.

Spectroscopic and photographic techniques were used in the Indian observations of the solar eclipses of 1868, 1871 and 1872 which attracted many observers from Europe also. But the scientists' agenda for the 1874 transit ran deeper. What was advertised was the momentary passage of Venus in front of the solar disc; what was planned was a long-term study of the disc itself. The *British Association for the Advancement of Science* even passed a resolution asking the government of India to make arrangement for observing the event and to provide instruments which were afterwards to be transferred to a solar observatory. Such was the prestige enjoyed by science and scientists in Europe at the time that the British empire as the owner of most of the world's sunshine could not but respond favourably if partially.

The transit was "officially" observed from Roorkee. Post-1874 India did serve as a sunny field station for Europe. From 1878 till 1925, ... In 1878 an Observatory was set up in Dehra Dun, with instruments sent out for the transit, for daily photography of the sun, which were sent to England on weekly basis. The arrangement came about as a result of the personal equation of the influential British scientist Joseph Norman Lockyer (1836–1920) with the Secretary of State for India, third Marquis of Salisbury (1830–1903) and lingered on till 1825 when the Observatory was dismantled and its instruments sent to Kodaikanal.

Following the Italian transit expedition led by Pietro Tacchini (1838–1905), a well-equipped astrospectroscopic observatory was set up in 1879 in the Jesuit-run St Xavier' College Calcutta. Regrettably it failed to produce any results.

Better luck awaited Takhtasinghji Observatory set up by Bombay government at Poona in 1888 for use by Kavasji Dadabhai Naegamvala (1857–1938) who regularly sent data to Lockyer. The observatory was closed down in 1912 on Naegamvala's retirement and its instruments were handed over to Kodaikanal.

A hundred years previously, colonial government had desperately sought the help of positional astronomy as a navigational and geographical aid. Its stake in new astronomy was however peripheral. Madras Presidency was hit by a severe famine in 1876–1877 due to failure of monsoon. The famine commission in its report submitted in 1881 pointed out that there was "sufficient evidence" of a correlation between monsoon and sunspot activity and recommended that "India should assist in the work of solar observations".

29.2 Kodaikanal Observatory

It was decided in 1893 to establish Kodaikanal Observatory with Charles Michie Smith (1854–1922), Madras Astronomer and a protégé of Astronomer Royal William Henry Mahoney Christie (1845–1922) as its director. In 1895 the plans for buildings and instruments were approved by the London-based Indian Observatories Committee, chaired by Lord Kelvin. The formal government sanction followed as a matter of course. The same year, the 100-acre site, locally known as Nadingipuram, was acquired and a road opened to the top. In October foundation stone was laid by the Madras Governor, third Baron Wenlock (1849–1912), in October. In July 1897, the north-south line was laid out atop the hill for the main building, then known simply as the observatory.

The Astronomer Royal, in India for the 22 January 1898 eclipse, visited Kodaikanal on instructions from the Secretary of State. At the time the foundations of the director's residence and of the main building were being dug. Plans were modified on Christie's suggestion. Instead of the three dome originally envisaged, only two were to be built with a diameter of 18 feet instead of 15.

While the local artisans were capable of conventional construction, domes were beyond their competence. The first building to be completed was the director's residence. Michie Smith moved in February 1899, in time to personally receive and handle more than thousand coolie loads of books and instruments. (The director's residence was named Michie Smith Hall in 1985 and now serves as a guest house.)

Once on site, Michie Smith "personally undertook the erection of the domes", doing with his own hands "all the

Figure 29.2: *Kodaikanal Observatory, Summit hall, housing the north and south domes*

work that could not be done by a common native village carpenter or blacksmith. This included the driving of some 2,300 rivets". At long last the two domes were "practically ready" by December 1899.

Early instrumentation for Kodaikanal came from four sources; original Madras equipment; instruments sent out to country-regionIndia for the 1874 transit; the ones expressly designed and constructed for Kodaikanal and assembled at Madras; and those sent from other government observatories.

29.3 North and South Domes

A six-inch telescope by Lerebours & Secretan of Paris, on English mounting, was installed in the north dome. Of 1850 Madras vintage, it was remodelled by Sir Howard Grubb in 1898. In 1912 it was adapted for white light photography of the sun and has been continuously used for daily taking a 20 cm solar picture the purpose since 1 August 1912.

The south dome has seen a succession of three telescopes. The first one to be installed was the transit-of-Venus six-inch Cooke equatorial. (After its first use in Roorkee, it was loaned to Lockyer for use in South Kensington. It was sent to Poona in 1885 and transferred to Madras in 1893 for Kodaikanal.) In 1912 this was replaced by another six-inch Cooke telescope received from Poona at the closure of the Takhtasinghji's Observatory. This telescope remained in tact till 1960 when the mounting was retained but the telescope tube was replaced by the eight-inch aperture telescope by (Troughton & Simms), which was renovated for photoelectric work.[1] It is now used for observing comets and for visitors.

The transit room was begun in 1900–01 and completed in 1903. It houses a five-inch aperture Cooke transit telescope. As part of Indian magnetic survey a magnetic laboratory was completed in 1902.[2]

It was under the charge of Survey of India from 1904 till 1918 when it was returned to the Observatory. It was closed in 1923 nd restarted in 1948. The laboratory is no longer in use.

29.4 Spectroheliograph, Photoheliograph and Tunnel Telescope

A spectroheliograph for photographing the sun in calcium K line received from Cambridge Scientific Instru-

Figure 29.3: *Kodaikanal Observatory, Spectroheliograph building and a plaque commemorating the discovery of Evershed effect*

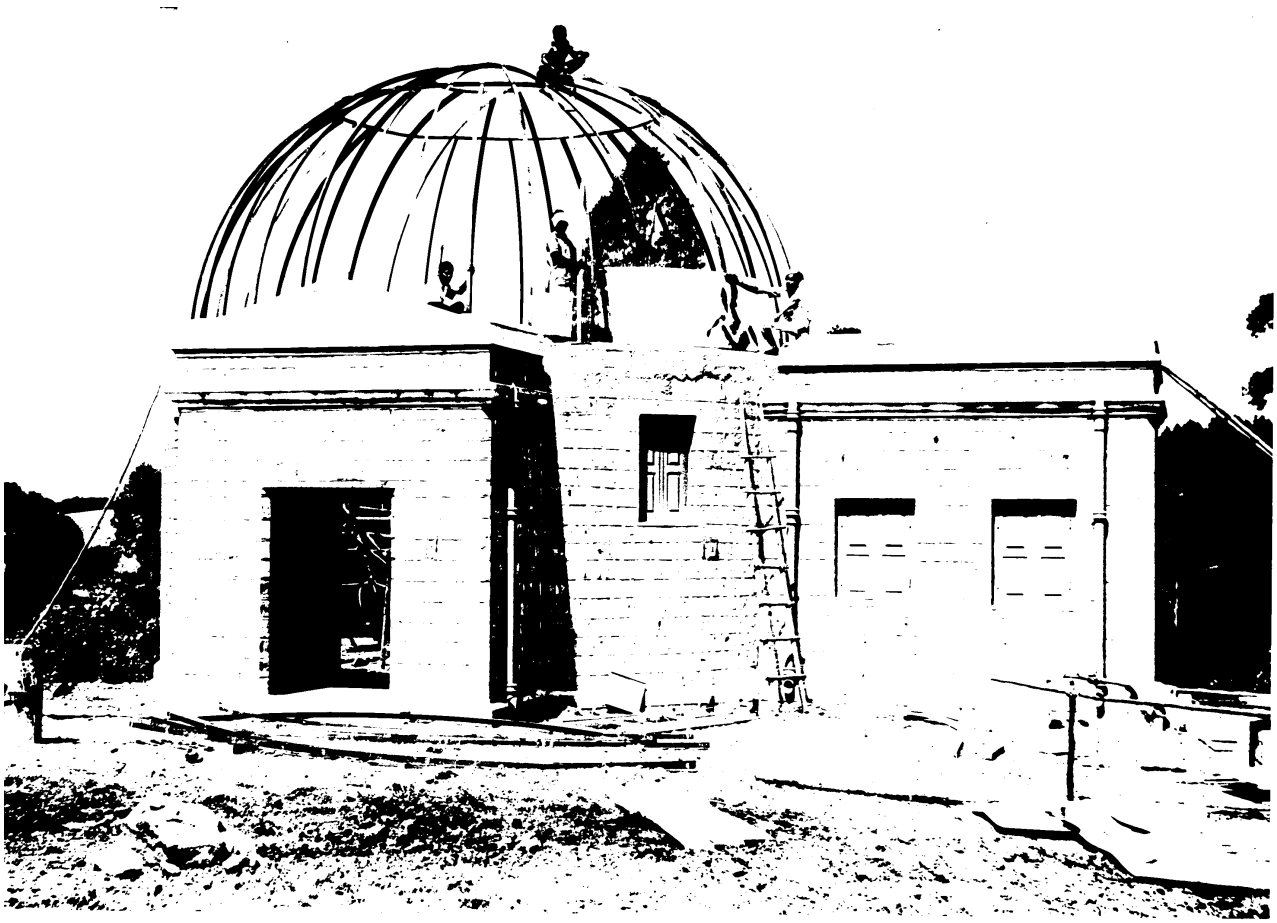

Figure 29.4: *Kodaikanal Observatory, Bhavnagar dome under construction*

ments Company was set up in 1904). John Evershed joined the Observatory on 21 January 1907. From a study of the photographs of the solar spectra taken with a spectrograph, Evershed himself had devised, he discovered, on 9 January 1909, the phenomenon of radial outflow of gases in a sunspot (Evershed effect). He went on to build in 1911 a new spectroheliograph for photographing the sun in hydrogen-alpha light. A third one was built in the 1960s to take solar pictures in any chosen colour.

Kodaikanal now has an uninterrupted record of solar activity with the same equipment for about a century now. Interestingly the spectroheliograph building houses a pendulum clock by John Shelton. Made for the 1769 transit of Venus it is similar to the one used by Captain James Cook in his voyages.

A photoheliograph, known as Dallmeyer No. 4, was received at Madras in 1895, on loan from Greenwich Observatory. It was first set up in an iron shed and then, in 1907, housed in a domed building. It was used for daily photography till August 1912 when as already noted the Lerebours & Secretan telescope was employed for the purpose. The Dallmeyer was dislodged from its dome in 1912 itself to make way for the transit-of-Venus Cooke from the south dome.

A residence, similar to but smaller than the Michie Smith Hall, was completed in 1908 for Evershed. Renamed Evershed Hall in 1985 it now serves as guest house.

A major instrument received in 1912 from Poona was the "Bhavnagar" telescope, with a 20-inch mirror by Dr A. A. Common and mechanical parts by Grubb. It was installed in a dome erected for it in 1951.

The most recent solar facility at Kodaikanal is a tunnel telescope with a 38 cm aperture, 36 m focus lens, made by Grubb & Parsons. Installed in 1958 it was acquired as a part of International Geophysical Year.

29.5 Landscaping

A comment now on landscaping. Most of the 100-acre grounds of the Observatory was either rock or grass-covered slopes. To reduce the disturbing effect of the sunshine on the bare ground and to modify the strength of the winds to which the Observatory was exposed, Michie Smith decided to cover the ground with trees and shrubs. In 1899 itself some 1500 trees were planted.

In 1904 seeds of various types of pines were received from Lick Observatory and Pasadena in southern California from which a large number of saplings were raised and planted. There was always danger of forest fires and at least one case of suspected arson in 1910. Wild grass

Figure 29.5: *Kodaikanal Observatory, Tunnel telescope, Grubb & Parsons, 1958*

was replaced by short grass, and wide fire lines were kept in good order.

To bring the story up-to-date, on 1 April 1972, Kodaikanal Observatory became the field station of the newly created *Indian Institute of Astrophysics*, headquartered at Bangalore.

1. The telescope had been installed in Madras in 1862 and was sent out to Kodaikanal in 1931.
2. Kodaikanal is barely half a degree north of magnetic equator.

29.6 Bibliographical Notes

(1) Most of the information is taken from the official annual Madras and Kodaikanal Observatory reports.

Two additional significant documents are:

(2) Report on Indian Observatories and their Organization, by Sir Norman Lockyer, 1898.

(3) Report on Indian Observatories, with Special Reference to the Proposed Scheme of Re-Organization, by W.H.M. Christie, 1898.

For a broader perspective, see

(4) Kochhar, Rajesh K.: The growth of modern astronomy in India 1651–1960. In: *Vistas in Astronomy* **34** (1991), p. 69–105.