retire in the near future. Its present daily programme includes the preparation of photoheliograms (diameter 8″) of photographs of flocculi in K and H-alpha light and of prominences in calcium light (sometimes in H-alpha light also) with the spectro-heliograph. Visual observations of the Sun with Hale's spectrohelioscope and observations of the metallic and other lines in prominences and on the disc are also included in the programme.

As a tribute to the pioneering work done on this line at Kodaikanal by Evershed and Royds, the International Astronomical Association in 1922, allotted to Kodaikanal the task of collecting from all the contributing observatories and collating the data obtained from the photographs of the solar prominences and the sun's disc in H-alpha light. Accordingly, this Observatory has been collecting these systematically and the data are being published since 1922. Studies of the character and motions of eruptive prominences and of solar out-bursts and other phenomena, related to the sun's activity, have formed an important part of the observational programme. The large contribution made by the Kodaikanal Observatory to the various programmes of International Solar Observatories, several of which are co-operative, is illustrated by the observational data made available to other observatories interested in solar problems. Duplicate spectro-heliograms are sent to (*i*) The Mt. Wilson Observatory, California (America), (*ii*) The Cambridge Solar Physics Observatory (England), and (*iii*) The Meudon Observatory, Paris. Photographs of solar activity, as indicated by the calcium and hydrogen flocculi, are sent to various commissions of the International Astronomical Union and records of bright eruptions are sent to (*i*) The Zurich Observatory, Switzerland, for collection and publication, and (*ii*) The Director, Colaba Observatory, Bombay, for correlation with magnetic studies. Special studies which include spectrophotometric work on selected lines in the sole spectrum of the disc and on the limb, together with laboratory work on atomic and molecular spectra have in recent years been introduced by Dr. A. L. Narayan. The photometric measures have been interpreted to give abundance of atoms in the solar atmosphere. The Observatory has been admitting since 1930, post-graduate students for research work in solar and laboratory spectroscopy. Some ideas regarding the activities of the Kodaikanal Observatory will be obtained from the selected photographs given in Appendix III.

The discovery of out-flow of gases above sun spots (Evershed Effect), the confirmation of the relativity shift of spectral lines, the discovery of Infra-red Oxygen lines in the solar chromosphere and prominences are some of the notable contributions made by Kodaikanal Observatory in astrophysics. Besides these, the laboratory work on the spectra of Arsenic and Bromine, phosphorus bands in the Fraunhofer spectrum, and the CaO and CH bands are some of the other works on atomic and molecular pectra done with a view to correlate solar spectral studies.

It must, however, be said that on account of the restricted nature of its activities the observatory has not grown and kept pace with the development of new knowledge and fundamental discoveries in astrophysics and our considered view is that in consideration of its excellent location for astrophysical work, and the very good work done by the institution in the past, immediate steps should be taken for its further development as detailed in the following paragraphs.

Proposals for the general expansion of astronomical and astrophysical research in India.

The Committee is also strongly of the opinion that immediate steps should be taken for the institution of astronomical observatories in some of the Indian Universities. There can be no proper development in astronomical studies unless the Universities impart post-graduate specialised courses in astronomy and astrophysics. To give effect to this, the Committee recommends that the three Universities, *viz.*, Delhi, Aligarh and Benares, which are financed by the Government of India, should be provided with necessary funds (an approximate cost for establishment of such an observatory is given in Appendix V) to obtain

the equipment to enable them to start astronomical and astrophysical observatories. It is hoped that the lead given by the Government of India in this respect would be followed by the Provincial Governments to provide similar equipments to the Universities maintained by them, and, if necessary, the Central Government may help such enterprise either by Provincial Governments or other institutions with finance, and other kinds of help.

We have divided our proposals into two parts, namely,—

1. Those coming under the long-range plan of development; and
2. Proposals which can be given effect to immediately (*i.e.*, during the ensuing four or five years), for strengthening and expansion of the existing observatory at Kodaikanal and for the institution of astronomical observatories in the three Universities maintained by the Government of India.

Long-range plan.

As a part of the long-range plan, we recommend that provision should be made for the establishment in Northern India of an astronomical observatory provided with a large sized telescope for special stellar work. This development cannot be undertaken until the required personnel competent to work with large sized telescopes are available. As a step towards that, the Committee recommends that suitable personnel should be selected and sent to U.K. and U.S.A. for training. It will also be necessary to appoint a small Committee which will go into the question of the selection of a suitable site after taking into consideration the "seeing" conditions of the various places available for astronomical work. This would preferably be located somewhere in Northern India at a place recommended by the above Committee. In this connection, it may be mentioned that the Nizamiah Observatory specialises in astrographic work which includes the determination of the positions and relative intensities of stars in defined zones. It has recently started work on the proper motion of stars and the programme also includes the systematic observations of many long period variable stars and occulations of stars by the moon. In planning the work and equipment for the Central Astronomical Observatory, which we have suggested above, the work of the Nizamiah Observatory should be borne in mind, and the programme of work and equipment so planned as to obviate overlapping. A very rough estimate of the long-range plan has been given in Appendix VII.

Short-term plans.

As proposals which should be given effect to immediately, we are of the considered opinion that not only the present activities of the Kodaikanal Observatory should be maintained but developed on a generous scale. The general scientific work of the Observatory should consist of three sections comprising of (I) Solar Physics, including laboratory work on atomic and molecular spectra, (II) Planetory and Stellar Spectroscopy, and (III) Ionospheric and Magnetic work. A broad outline of the lines on which the work should be planned is indicated below:

(I) *Solar Physics.*

The development of the coronograph and coronaviser have opened new fields for observation and interpretation. Coronograph is a powerful instrument for the study of prominence motions. Till a few years ago, the solar corona could be observed only during total solar-eclipse; but now, with Lyot's coronograph, these can be photographed even under ordinary conditions. Much observational work is needed before a full understanding of the conditions in the corona can be obtained. As Professor Waldmeir puts it "the most ardent eclipse observer can have on the average only one minute per year for observation of the corona". Thus, the information that can be gained from the study of nature's eclipses is far too fragmentary. Motion picture technique recently introduced at the McMath-Hulbert Observatory has revealed, what years of direct photography