

ASTRONOMY IN JAPAN

By ISSEI YAMAMOTO

Before the "Restoration"

In the old days, before about 1870 A. D., Japanese astronomy was an imitation and reproduction of Chinese science, and the main service of the astronomer was the publication of annual calendars. Both in Kyoto (the Imperial Capital) and in Yedo (now Tokyo), there were official astronomers, who, however, made few observations of their own. International relations between Japan and some European countries existed as early as the seventeenth century, but their influence on Japanese astronomy was very slight and only appreciated by a few non-official scholars.

Observatories of the Present Time

Tokyo Observatory: This was formerly the University Observatory of Tokyo Imperial University, but became an independent institution last year.

Position: $\lambda=9^{\text{h}}18^{\text{m}}58^{\text{s}}$ E; $\phi=+35^{\circ}39'17''$; $h=25$ meters.

Members: Sh. Hirayama (Director), K. Hirayama, K. Sotome, M. Hashimoto, T. Matukuma, K. Kudara.

Instruments: 5-inch Repsold Transit, 8-inch Gautier Meridian Circle, 8-inch Troughton-Sims Refractor, 6-inch Merz Refractor, 8-inch Brashear Astrographic camera, 3 Riefler clocks.

Publications: *Annales de l'Observatoire de Tokyo*; articles in *Memoirs Tokyo Imperial University*, College of Science.

Tokyo Imperial University, College of Science.

Services and Works: As regular services of a *national observatory*, time determinations and calendar computations are carried out. Spectroheliographic observations are made regularly, observations of the Moon's transits and occultations, occasionally. Several expeditions for observing eclipses and comets have been made by the staff. Regular courses of instruction are given.

Kyoto University Observatory. The official name of the institution is the "Cosmophysical Institute" of the Kyoto Im-

perial University, and it is mainly aiming at the astrophysical lines of research, in contrast with the more or less "fundamental" (astronomical) lines of Tokyo Observatory.

Position: $\lambda=9^{\text{h}}3^{\text{m}}7^{\text{s}}$ E; $\phi=+35^{\circ}1'37''$; $h=55$ meters.

Members: S. Shinjo (Acting Director), I. Yamamoto, Y. Ueta, M. Yamasaki, T. Araki.

Instruments: 7-inch Zeiss-Sartorius Refractor, 10-inch Brashear Reflector, 8-inch Mirror and Coelostat, Toepfer Spectroheliograph, 2 Riefler clocks, Bamberg transit.

Publication: Articles in *Memoirs of Kyoto Imperial University*, College of Science.

Services and Works: Regular courses of instruction are given, and time services are carried on. Several astrophysical researches on spectroscopy, photometry, photography, refraction, and theoretical problems are completed or in progress. Several expeditions have been made.

Mizusawa Latitude Observatory. This is the continuation of the International Station for the study of latitude variation, which was started in 1899.

Position: $\lambda=9^{\text{h}}24^{\text{m}}31^{\text{s}}$; $\phi=+39^{\circ}8'4''$; $h=61$ meters.

Members: H. Kimura (Director), S. Kawasaki, T. Ikeda.

Instruments: 4-inch Zenith telescope.

Publication: *Annual Report of Meteorological and Seismological Observations.*

Services and Works: Continued observations of latitude and its variations; meteorological and seismological observations.

Kobe Marine Observatory. This is nominally a meteorological observatory, but it has just begun its solar observations in connection with its national services.

Members: T. Okada, K. Sekiguti.

The above are all supported by the Imperial Government. There are several schools and colleges which have some astronomical instruments, thus: Tohoku Imperial University (6-inch Zeiss Refractor), Tokyo Naval College, etc., but their equipments are not completed, and the actual work is that of instruction. Besides the above, there are several private observatories, which are kept mainly for personal interest. The

instruments range up to 10 inches or more, types being both refracting and reflecting.

Popularity of Astronomy

There are two large astronomical societies in Japan: (1) The Astronomical Society of Japan, founded in 1908 by Prof. T. Teras, the former director of Tokyo Observatory. It has about 600 members, and its organ is the "Astronomical Herald," published monthly at Tokyo. Its office is the Tokyo Observatory. (2) The Society of Astronomical Friends, founded in 1920 by I. Yamamoto. It has about 1200 members. It publishes "The Heavens," monthly, at Kyoto, and the "Bulletin" (in English), at irregular intervals. Its office is the Kyoto University Observatory. A number of books on astronomy have been written by several authors, and books by Newcomb, Arrhenius, Turner, Einstein, Young, and others have been translated.

Prospects

Tokyo Observatory. Because of the recent development of Tokyo city, the site of the observatory has become bad for astronomical observation, surrounded by street lights and smoke. A "retreat" was planned some years ago, and at last a new site was obtained at a place about seven miles west of the present one, being outside the limits of the city. The building of domes and offices and residences has almost been completed now, so that the actual removal of the whole observatory will take place in the near future.

Kyoto University Observatory. The site of the institute is pretty good for observation, because it is very near to the limit of the city, which is not really one of industrial prosperity. The observatory is young in its establishment, being about fifteen years old, and several parts of it are in the stages of planning or construction. For instance, a new and enlarged office building and a physical laboratory are now in process of erection. A dome for a 10-inch reflector and a room for solar work will be finished at the same time. A large telescope, 20-inch or more, is being planned for.

Society of Astronomical Friends. This society has more than fifteen branches in different localities of the country, many

of which are very ambitious for their future development. Among the members there are a great variety of professions. School teachers are attempting to give common knowledge of the science to their pupils in efficient ways. Young people are preparing themselves to become life students of the science. Business men are planning to found private observatories. In fact, more than thirty telescopes, of 3 inches or more, were imported from abroad in the past two years.

The general public is rapidly gaining an interest in astronomy through books, magazines, and newspaper articles. Some books are going into their tenth edition or further. Astronomical contributions to popular magazines and daily newspapers are warmly welcomed. Every telegram from Copenhagen of a new astronomical discovery is quickly circulated by the papers. The most effective evidence of the popularity of astronomy today in Japan was recently shown by two exhibitions of *purely astronomical* matters and facts at Osaka, in 1921 and 1922, which is a new record.

During the past two and a half years, I have given many popular lectures on astronomy, at least two a month, in different parts of our country. Moreover, since my arrival in the United States last October, I have made half a dozen similar speeches to Japanese people of this country. Through these experiences, I am satisfied that the Japanese people have the ability to enjoy the stars and the science of astronomy in an unexpected degree. So the future is bright.

Recently many optical shops have been started in Osaka and in Tokyo, so that 3-inch lenses can, without much difficulty, be home-made now. Last year, a Tokyo company was successful in making a *complete* set of a 20-inch reflector, which was exhibited to the public as a partial contribution of the company to a National Peace Memorial Exhibition, held at Tokyo.

At the Department of Education of the Japanese Government

National Geodetic Committee. This consists of more than a dozen professional scholars, and is rendering great services to astronomy in the wider sense. Longitude and latitude determinations in many points of the country have already been made, and as a continuation of them the deflections of the

local plumb-line (*Lotabweichung*) are being observed by the committee. The Mizusawa Latitude Observatory received material support from this committee in its early days. The intensity of gravitational force and its precise derivatives are also being observed in many places, using pendulums and torsion balances of the most advanced types.

Astronomical Department of the National Research Council. This was started just after the international plan of this body was announced. It has about a dozen members representing several institutions. The following three steps have been decided upon for its first efforts: (1) A powerful solar observatory, to be established in a suitable part of the country, as a national contribution to the world. (2) A "Southern Observatory," to be established in the lowest possible latitude, to study astronomy generally, in conjunction with several allied sciences. (3) A publication, in a foreign language, to communicate the results of researches by our national scholars to the world.

Lick Observatory, July, 1923.