

The Astronomer in Europe

Astronomy

Prepared by James Stokley, largely from information gathered on personal travels.

With the world's largest telescopes located within the United States itself, as will be described in next week's American travel number of the SCIENCE NEWS-LETTER, some Americans are apt to forget that there are really important and interesting astronomical centers in Europe. But, it must be remembered, before there was any permanent settlement in America, European astronomers were gazing through telescopes at the heavens. And also, even in America, we measure our longitude from a telescope on the outskirts of London.

The points of astronomical interest in Europe to attract the scientific tourist are of two kinds. One includes the astronomical "shrines," places where some great worker of the past made great discoveries, or places where the relics of the scientific "saints" are preserved. Then there are the modern institutions, where research is being carried out. Of course, in some instances, the two coincide, as at the Royal Observatory at Greenwich, where the original Flamsteed House still stands as part of the present day observatory.

Probably the most complete tour of European astronomical centers that has been made was that of Mr. David B. Pickering, president of the American Association of Variable Star Observers. He has made two recent trips to Europe, on which he has visited practically all the points of greatest astronomical interest. His travels are described in a series of illustrated articles that has been appearing in *Popular Astronomy* at irregular intervals under the general title of "The Astronomical Fraternity of the World." No intending astronomical traveler should possibly fail to look up and read these articles.

ASTRONOMICAL SHRINES

Starting in *England*, the most important "shrines" are probably those associated with the immortal name of Isaac Newton. These are scattered in various places, and the visitor does not need to leave *London* to see some of them. At Burlington House, on Piccadilly, is located the headquarters of the Royal Society, most famous of all learned bodies. In their library one can see such Newton relics as the original

manuscript of the *Principia*, the original reflecting telescope, only a few inches long, which he made at Cambridge and submitted to the Society in 1672, numerous Newton letters and other writings and a famous contemporary portrait. In another part of the same building, across a court, is the headquarters of the Royal Astronomical Society. Here is a piece of the apple tree that stood in Newton's orchard, and under which he doubtless often sat in cogitation, though he may or may not have observed the apple falling from it that has been said by Voltaire to have given him the idea of gravitation.

Leaving London, one can go to *Grantham*, in Lincolnshire, where the young Newton went to school, and where there can still be seen the initials I. N. that he carved on a window frame as a boyish prank. About 6 miles away is *Woolsthorpe*, where he was born. Visiting *Cambridge*, at Trinity College, there can be seen mementoes of Newton's college days, and his life as Lucasian professor.

His tomb is situated in a prominent place in Westminster Abbey, *London*.

Next to Newton, the greatest name in English astronomical history is probably that of Sir William Herschel, who really made the first of the great reflecting telescopes, instruments that even today would be rated as large. Following his discharge from the Hanoverian Army, he went to England as a musician. Settling in *Slough*, in Bucks, he soon became interested in astronomy and made his own instruments, which he used with the help of his sister; Caroline. His house is still standing, it is still occupied by his descendants, and is filled with relics of Sir William's occupancy, including many of his actual instruments, and pieces of his greatest telescopes. A complete description of the relics was given in the "Transactions of the Optical Society," Vol. XXVI, No. 4, published in 1924. This was written by Dr. W. H. Steavenson, whose work has done considerable to save them from neglect.

The Flamsteed House, the oldest part of the Royal Observatory at *Greenwich*, should be seen by the visitor to *London*. Frequent trains from Charing Cross station take you to the entrance of Greenwich Park,

in the center of which is the observatory. This is shown on our cover illustration. It was built by Flamsteed, first Astronomer Royal, in 1675, partly from funds provided by the government of Charles II, from the "sale of spoiled gunpowder," the plans being made by the famous architect of St. Paul's and other prominent London structures, Sir Christopher Wren. In the "Octagon Room" in this part of the observatory are numerous old astronomical instruments, including John Harrison's original chronometer, the invention of which made modern navigation possible.

Crossing to the continent, the *Paris* Observatory attracts attention. Situated at the end of the *Avenue de l'Observatoire*, which, at its other end, terminates at the *Jardin de Luxembourg*. Like Greenwich, the Paris Observatory is an old structure with recent additions, notably the two telescope domes on the roof. Entering the gate, the visitor first sees the statue of Le Verrier, co-discoverer with the Englishman, Adams, of the planet Neptune. Beyond is the main building, of even greater antiquity than Flamsteed House, for it dates back to the reign of Louis XIV, under whose direction it was started in 1667 and completed in 1671. Inside are rooms probably of very much the same appearance as they had in those days. Old and historic astronomical instruments are on exhibition.

In *Italy* can be found various reminders of Galileo. In the Museum of Physics and Natural History at *Florence*, near the *Pitti Galery*, is the *Tribuna di Galileo*, where the visitor can see two of his telescopes, as well as the actual lens of his "old discoverer," with which the satellites of Jupiter were discovered.

Many other relics of this great astronomer are shown in this museum, including, strange to say, his left index finger! Galileo's tomb, marked by an appropriate monument, is also in Florence, at the Church of Santa Croce.

Traveling north to Germany, *Bonn* is of interest because of the little three-inch telescope of Argelander's, preserved at the observatory. It was with this little instrument that he made the observations for the great *Bonn Durchmusterung* (1852-1859), still the fundamental star catalog. (*Turn to next page*)

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The original cards on which he made pencil notes in its preparation are also still preserved.

Still farther north, in *Sweden*, at *Copenhagen*, one finds an observatory that antedates Paris and Greenwich, though it has not been used as an observatory since 1861. It has the form of a round tower, which was completed in 1642 by King Christian IV of Denmark, and visitors can still ascend to the top. An illustrated description of it is given by Professor Florian Cajori in the April (1928) issue of the *Scientific Monthly*.

THE MODERN OBSERVATORIES

Just as the modern world measures longitude from the *Greenwich* Observatory, so shall we start our description of present-day observatories with that institution. In the largest dome, a bulging affair, which gives it a curiously oriental aspect, is the 28 inch Grubb refractor, largest refracting telescope in England. But the instrument of perhaps greatest significance here is in a lower building, almost under the great dome.

Beneath a slit capable of opening from north to south is the meridian circle, or transit instrument—the official time teller of the British Empire, and the marker of the meridian of 0° longitude. Standing in front of this, or on the line marking the meridian outside the observatory wall, one can enjoy the unique privilege of having one hand on the eastern side of the world, and one on the western!

At *Cambridge* University are two important observatories in close juxtaposition at a spot a mile or so out of the center of the town. One is the University Observatory, now chiefly famous because it is here that its director, Prof. A. S. Eddington, and one of the world's leading astronomers, is engaged in his important researches. An interesting telescope seen here is the Sheepshanks instrument, in which a mirror reflects the star image up to a lens 12 inches in diameter. The observer sits in a small room, constantly looking down. At the Solar Physics Observatory, on the same grounds, is a telescope with a lens of 24 inches aperture.

Oxford, likewise, boasts two observatories, the University, and the Radcliffe. A photographic telescope of 24 inches aperture is the largest instrument.

At *Paris* the most important observatory is the National Observatory, already partly described because of its historic interest. Here one also finds a number of more modern instruments. These include a reflector of 47 inches aperture, the equatorial coudé, another type of telescope that enables the observer to sit in a small room and look down at the stars, with a 24 inch lens, and many smaller telescopes. Partly because of the poor atmospheric conditions at Paris, these instruments have only been used occasionally in recent years, and many of them have been allowed to fall into disrepair.

A short distance from Paris, easily reached by train from the *Gare Montparnasse*, or by the electric trains from the *Gare des Invalides*, is *Meudon*, the chief center of French astronomy. The observatory here is now operated as a branch of the one at Paris, and boasts the largest refractor outside the United States, with a lens of 32 inches aperture.

It is in *Germany*, however, that the American visitor, familiar with our own well equipped institutions, will find himself most at home. For completeness of equipment, for all branches of astronomy, probably no other observatories, even in the United States, can equal those of *Hamburg* and *Berlin*. The former is the *Hamburger Sternwarte*, located at *Bergedorf*, on the margin of the city and close to the Prussian border. A 40 inch reflector, a 24 inch refractor, a triple photographic telescope, smaller instruments, transit circles, measuring engines, accurate clocks, and other appurtenances of a well equipped observatory, all in perfect mechanical condition and in continual use, gladden the astronomer's heart!

The observatory of the University of *Berlin*, at *Neubabelsberg*, one of the city's fashionable suburbs, is reached by the *Stadtbahn*, and has even larger instruments than *Hamburg*. A 48 inch reflector here is the largest telescope in Germany, or, for that matter, in Europe. There is also a 24 inch refractor, several smaller telescopes, including several for photographic purposes. As at *Hamburg*, all of these are in the finest mechanical condition, a state of affairs that seems to be typical of German observatories. This observatory, which is operated jointly by the University and the Prussian

Government, also provides standard time for Prussia.

Near *Neubabelsberg*, two stations beyond, and at a terminal of the *Stadtbahn*, in *Potsdam*. Here one not only finds the former imperial palace that all tourists visit, but also the Astrophysical Observatory, with its great double-barrelled equatorial refractor. A 31 inch photographic telescope and a 20 inch visual one are mounted side by side. Also at *Potsdam*, though with its own director, is the Einstein Tower, a curious looking structure of concrete which is a tower telescope for solar and stellar observations, especially with the spectroscope, and also a laboratory for physical experiments along related lines. It was especially intended to test some aspects of the relativity theory, hence its name.

At *Berlin* one also makes the acquaintance of a type of observatory that is common in central Europe. This is the strictly popular observatory, that carries on no research, but exists solely for the important work of instructing the laymen in the mysteries of the stars. The one at *Berlin* is the *Treptow* Observatory. Here one finds an interesting astronomical museum, frequent illustrated lectures on astronomy, and the chance of looking at the heavens through a 24 inch telescope especially designed for popular use by the director, Dr. Archenold. A small admission charge is made to visitors.

Also in *Berlin* is the planetarium, described in detail in another article.

In other European countries the observatories are not so likely to be visited, though many of them are of great importance. At *Vienna* is the University Observatory, with its great 27 inch refracting telescope. In *Vienna*, also, there is a *Urania* Observatory, for the people, and a planetarium.

In *Italy* there is the *Merate* Observatory, about 20 miles northeast of *Milan*, where a 40 inch reflecting telescope has just been completed. This is the largest telescope in Italy. The Royal Observatory at *Rome* is important for its researches, especially those on the diameter of the sun. Also in *Rome* is the Vatican Observatory, operated for many years under the direction of Father J. C. Hagen, S. J., formerly of Georgetown University, Washington, and the leading authority of the world on variable stars.