PRICELESS ACCESSIONS TO WHITIN OBSERVATORY WELLESLEY COLLEGE.

SARAH F. WHITING.

"As Newton accomplished the extension of terrestrial dynamics to the heavens, so William Huggins extended to the skies the laws of terrestrial physics."

It is well known that before the death of Sir William Huggins the major instruments of the Tulse Hill Observatory were removed to Cambridge, England. There they are set up in a new observatory presided over by Professor H. F. Newall, the first to occupy the newly created "Huggins Chair of Astrophysics".

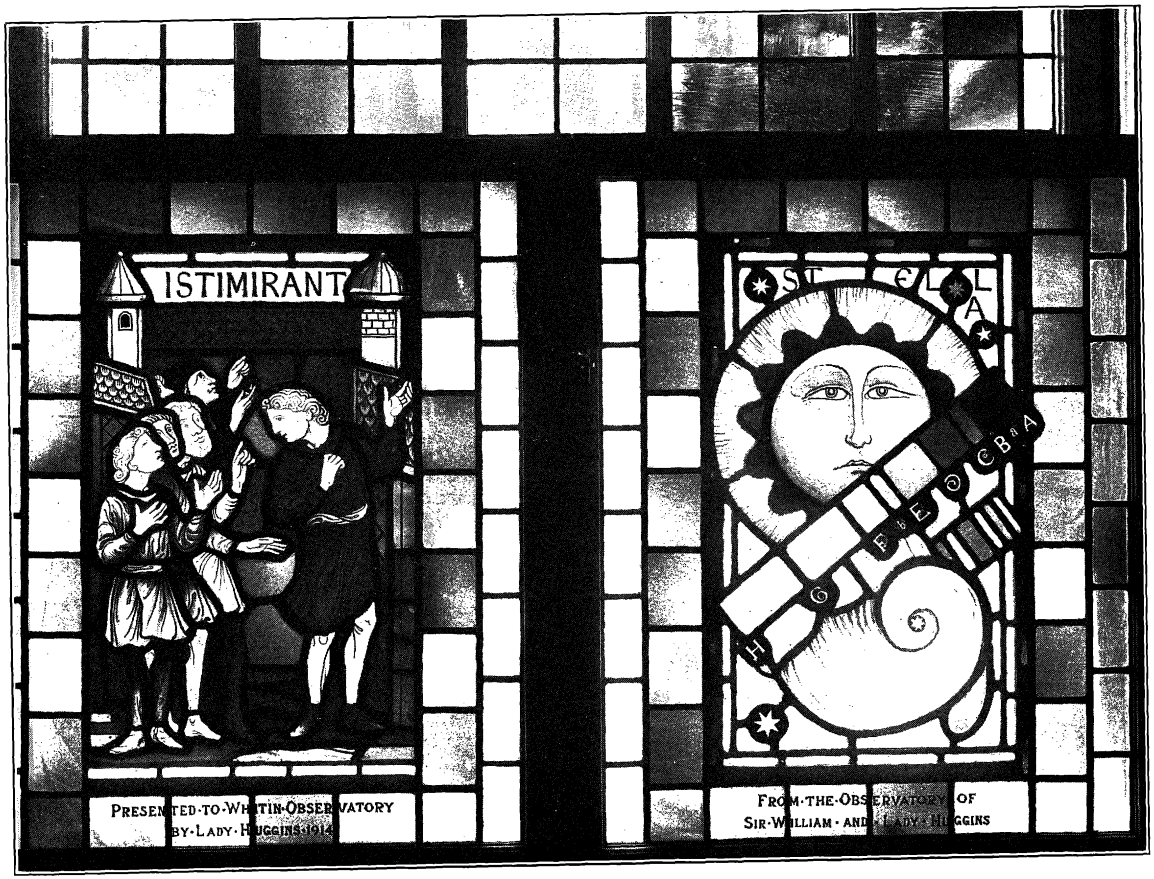
The Tulse Hill home connected with the observatory, where so many American astronomers have found cordial welcome, was after the death of Sir William quite dismantled, and its wealth of treasures scattered. Lady Huggins removed to Chelsea where on the site of the former residence of the famous Sir Thomas More, beside the Thames, in a choice apartment, she is still working, as her delicate health permits, upon a memoir of her husband.

Any book which comes from her hand may well be anticipated, for no such beautiful volumes grace the shelves of the libraries in Astronomy as the two Tulse Hill Observatory publications:—the "Atlas of Representative Stellar Spectra" and "The Scientific Papers." There is a third equally perfect book edited by Lady Huggins,—"The Royal Society." In this, in addition to the four notable addresses which Sir William gave as president of the Royal Society, is included its history and a wealth of illustration.

Lady Huggins has been pleased to deposit in Whitin Observatory of Wellesley College—a Woman's College, in the new world—certain of her more personal astronomical possessions. Herself a pioneer in science, one of the remarkable women of the transition period, who without the modern college training, has made herself an authority in many lines, she has been deeply interested in the new opportunities for women opened in this generation. She often expresses herself solicitous that the younger race should not lose a whit of the earnestness and depth of scholarship which characterized such early leaders as Mary Somerville and Anna Swanwick.

The gift to Wellesley includes two stained glass panels once in the doors at Tulse Hill, but now combined in one window at Whitin Observatory.

PLATE XXI



STAINED GLASS PANELS FROM TULSE HILL OBSERVATORY HOUSE.

The left hand panel is from the Bayeaux Tapestry. It represents the untutored crowd gazing into the sky and pointing at the portentous comet of 1066, which we now call Halley's comet. "*Istimerant Stella*" is the inscription above. On the second panel, Sir William chose to group the typical objects of wonder and study in the sky. Here are represented not only the comet, but the great sun with its chromosphere and corona, the nebulae and stars. But across the panel in brilliant colored glass is the sun spectrum, with the well-known lines of Fraunhofer in place, and below a second spectrum with the bright lines characteristic of a gaseous nebula discovered by Sir William. Here is typified the finite mind of man wondering at and baffled by the riddle of the universe until the spectrum gives hope of solution.

The third glass panel is for the Observatory House. It is specially precious as it was a silver wedding gift to the astronomers. The recipients chose the subject and Lady Huggins directed, as in the other case, the coloring and leading of the glass. This panel represents Christian in the Pilgrims Progress meeting the three shining ones, one of whom salutes him with the comforting phrase, "Thy sins be forgiven thee,"—the second bids him exchange his rags for fair raiment,—the third gives him a sealed roll, his passport to the Holy City. Lady Huggins remarks that this window was placed where everyone in the house saw it in the morning, and that it always reminded them of spiritual presences and help.

All the glass is, as far as possible, pure pot-metal color, in the style of the thirteenth century and designed with a knowledge of glass work.

The students who crowd the Whitin Observatory will certainly find, as did the donor, "that the influence of good stained glass is great and quite peculiar."

Another most interesting object is the seal of Sir William used by him on all important documents especially during his five years presidency of the Royal Society. It was designed by Lady Huggins, and was made in glass paste by Tassie of London, a copy of a fifteenth century gem in a cabinet in Paris. The subject is Apollo in his car driving the horses of the sun in the midst of the zodiac. The impression from the seal in wax is so clear that each separate horse of the quadriga and every minute figure of the signs of the zodiac is easily distinguished. The handle of the seal is in silver gilt. The latter was picked up by Lady Huggins in Holland, a seventeenth century piece of work, originally a knife-handle. It represents St. George slaying the dragon. The subject is treated in a most unusual and difficult manner with wonderful skill. The horse and rider are standing vertically.

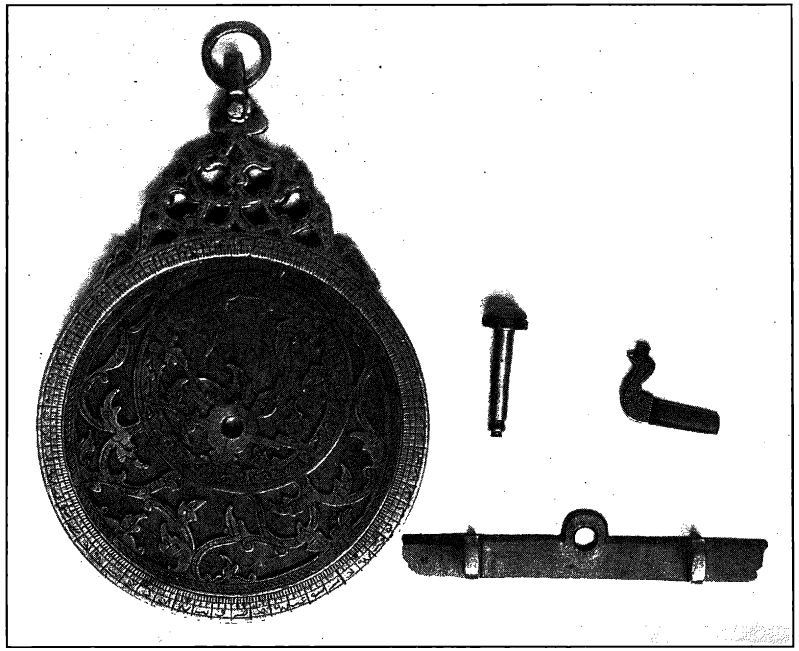
Lady Huggins knows of no other vertical treatment of a horse and rider save on the doorway of the Cathedral of Notre Dame in Paris.

PLATE XXII

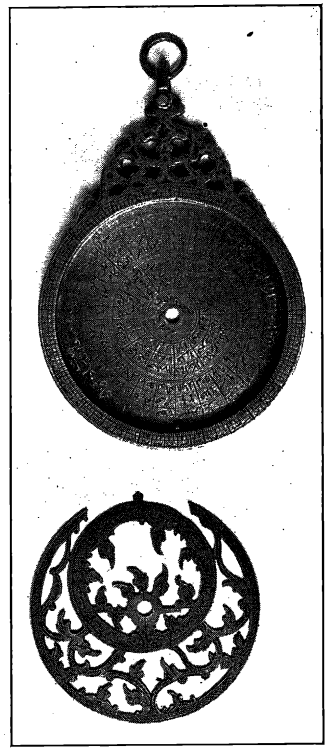
STAINED GLASS PANEL.

A Silver-Wedding Present to Sir William and Lady Huggins

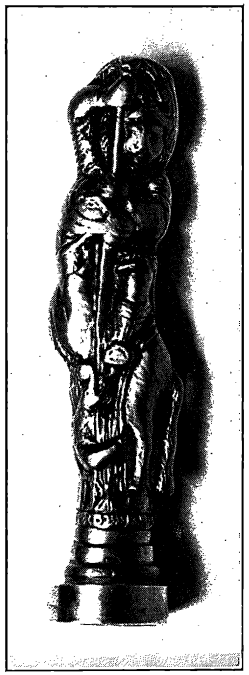
PLATE XXIII



ARABIAN ASTROLABE, DIAMETER 3.5 INCHES, PIN, WEDGE, RULE.



ASTROLABE WITHOUT PLATES AND RETE, SHOWING NAMES OF CITIES WITH LATITUDE AND LONGITUDE. THE RETE, EACH POINT SHOWING THE POSITION OF A STAR, WITH THE NAME ON THE LEAF.



THE SEAL OF SIR WILLIAM HUGGINS.

Here are carved in small rectangles scenes from the Apocalypse. Death on the pale torso is represented by a woman, who leaping up in front of a man stabs him. He falls off clinging to the horse's neck and is making a mad rush in an agony of terror.

This description by Lady Huggins caused the writer, in a pouring rain, to search on the doorway of the famous cathedral for this detail, and she was rewarded by discovering many other wonders of mediaeval carving.

Sir William and Lady Huggins loved to feel the atmosphere of antiquity which invests the science of astronomy, to trace in its development the awakening intelligence of the race. This was witnessed some years ago by an illustrated article in POPULAR ASTRONOMY by Lady Huggins on an Astrolabe in her possession.

An object of great historic interest in the gift to Wellesley is an Arabian Astrolabe. It is not the one just referred to, but one as perfect. Much decorative skill as well as scientific knowledge was employed upon these instruments. On this specimen the decorations are most artistic and effective. There are remains of red enamel on the "throne" or top part, and such decoration was not usual. The wedge which holds the index in place, the head of a crested bird is most picturesque; the "Rete" or "Spider," the open work disc is most charming; on this is the zodiac and pointers like delicate leaves with Arabic characters upon them which show the positions of twenty-four stars in both northern and southern hemispheres.

By the kindness of the Professor of Arabic at Harvard University, the names of these reference stars have been read and the crowded characters on the instrument beneath the movable plates have been also interpreted. Here are the names of almost every city in the east, —Mecca, Medina, Bagdad, Samarcand—with the latitude and longitude of each, the longitude in every case reckoned east from the Azores. There are five plates for different latitudes on which the concave vault of the sky is projected on a plane parallel to the equator and the almucantars and vertical circles are drawn for every ten degrees.

On the arrival of the Astrolabe at Wellesley we immediately consulted Chaucer's treatise on the Astrolabe written for "litell Lowis my sone." It reads like a laboratory book of directions. In it we have found how the leader of a caravan could get his time and place as he crossed the desert, or how Columbus could keep his course westward, by observations on the "Pole Star" and "the Guards," that is *beta* and *gamma Ursae Minoris.*

The use of the Astrolabe is not quite so easy as one might think from Chaucer's statement to his little son that he does not describe

all the "conclusions apertaining to the same instrument.....since some of hem ben to harde to thy tendre age of ten yeer to conserve."

It so happens that the writer picked up in Germany last summer a book of 1597 concerning the making and use of diverse instruments of Astronomy and Cosmography. The book had a beautifully designed and engraved title page and some remarkable diagrams, with circles and pointers which moved, which attracted her attention but it was not until an astrolabe was examined and the numerous cuts in the book compared, that it was apparent that directions for every detail for projecting the circles, placing the points for the stars and graduating an astrolabe were given in the book. So interesting is all this that one is tempted to continue Italian, for the book is in that language, turn back the pages of time and leave investigating the micrometer screw of a modern measuring engine to make and use an ancient astrolabe.

A ring sundial which was carried in a gentleman's pocket before the day of watches is another antique. When the circles are adjusted to the latitude and the tiny hole, through which the ray of sunlight passes, to the declination, and the meridian circle is held north and south by the swivel ring, the time could be told quite near enough for the days of slow movement.

Another sundial, picked up from the famous Spitzer collection in Paris, added to the collection by the writer, is yet more exquisite. It is of silver and fits into a case scarcely larger than a good-sized watch. The gnomon can be turned up by a hinge; on it a bird's beak serves for an index to set it to the latitude and a compass to place it in the meridian. Two scales of hours are engraved on the face and on the under side are the names of the principal cities of Europe with their latitude. These sun-dials were made in Paris about 1750.

To come to more modern things we shall highly prize a Rutherford diffraction grating which Lady Huggins thinks most fitting to place in a permanent home in the land from which it came. It will be remembered that Rutherford of New York was one of the first to photograph the sky. Columbia University Observatory possesses his plates and has made them useful for investigations. Our observatory is fortunate to possess one of his really fine photographs of the moon taken by the old wet collodion process. Rutherford worked upon the sun-spectrum, and wishing to follow Fraunhofer in the use of a grating, proceeded to invent and construct a dividing engine, and to rule gratings. This one he gave to Sir William Huggins, who used it much after he had it mounted by Hilger with a quartz plate cover. In the early eighties of the last century thirteen hundred and eighty lines was a large number to rule in the inch.

There are in this gift three small instruments which were specially constructed for the Huggins's to take on their vacation trips:—an Adams pocket sextant, a beautiful thing, most ingenuiously packed in a small case; a Dolland traveller's telescope with four powers and a dark glass, also so cleverly arranged that while it will show the moons of Jupiter and divide double stars it can be carried in a small travelling bag. Lady Huggins remarks that such things are no longer made. The third instrument is a little reflecting telescope by J. Cuthbert, with four powers and a finder. It is of the Gregorian form with pierced mirror. This also will divide the easier double stars and show sunspots.

Besides drawings, manuscript and some historic negatives the collection includes several pictures of interest. The finest is an unusually successful large reproduction of the portrait of Sir William Huggins by the Hon. John Collier. This portrait is in the rooms of the Royal Society. Lady Huggins asked the artist to sign the copy she sent and also appended the signature of Sir William. It now hangs near the astronomical window and the case of memorial gifts, and beside it we have placed that fine portrait of Darwin showing the face with its impressive forehead and overhanging brows almost in profile. Darwin is here in appropriate company, for when the new science of astrophysics revealed the constitution of the stars astronomy was immediately annexed to the subjects pursued after the Darwinian manner and problems of stellar solution could be solved.

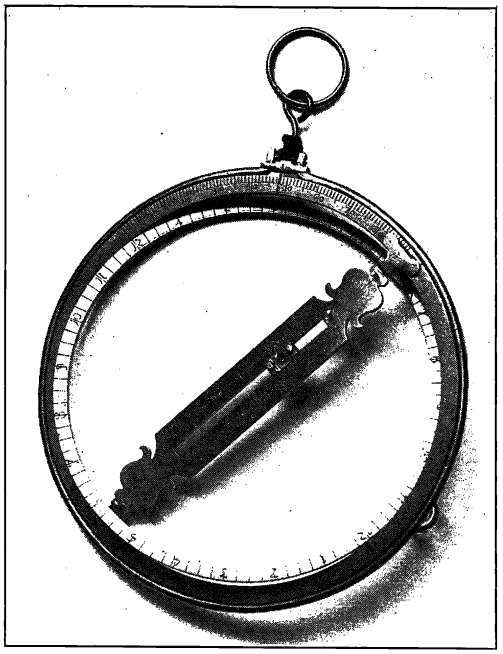
But the true significance of a memorial gift and its inspirational value depends upon the personality of those from whom it came, what they were and what they achieved.

Here we have reminders of the work of scientists of the first order, and of their wide range of related interests. Lady Huggins is not only an astronomer, but her cultivation in many lines of art has been revealed to her friends by the reproductions of exquisite watercolors and etchings which frequently came with holiday greeting, now and then accompanied by a verse of true poetic feeling.

It is quite impossible to reproduce with vividness after the lapse of years original impressions, it may therefore be permitted to quote from a letter written in 1896 after my first visit to the Huggins's.

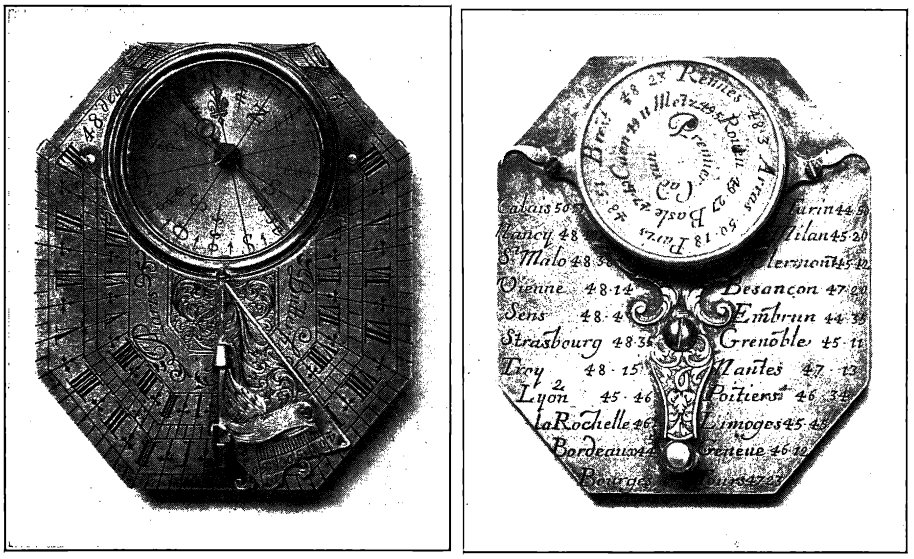
"I must tell you of my astronomical experience,—a visit to the Huggins's whose work is considered most remarkable and whose charts of star spectra I use with my classes. I was invited there Monday. A lovely lady, who was not at all ordinary, but like an embodied poem or piece of music met me at the door. She had a spirituelle face set with gray hair, she wore a trailing satin skirt and red velvet loose jacket of quaint cut. Behind her was Mr. Huggins, a distinguished looking man with remarkable eyes. The drawing room through which I was

PLATE XXIV



ENGLISH UNIVERSAL RING DIAL

A kind of Armillary Sphere in general use over Europe
from beginning of 16th century



SILVER DIAL BY MACQUART OF PARIS ABOUT 1740.

The bird Style, which can be adjusted to the latitude, can be folded flat so that the dial may fit in a case.

POPULAR ASTRONOMY, No. 218.

led was a most refined room, the walls covered with pictures from the Old Masters. The library was next, its walls covered with books in cases separated by richly carved panels, the wood carving done by Mrs. Huggins. The end of this room was almost entirely of plate glass, so that on a dark English day it would appear as if one were sitting in the garden, in the center of which I noticed an armillary sundial.

"I had a wonderful scientific séance, saw the historic photographs of star spectra and felt the thrill of excitement with which these negatives were first examined. I saw the twin telescopes and spectroscopes of most ingenious form. Later I was taken to the music room;—both Mrs. Huggins and her husband are musicians. The collection of historic violins and flutes was shown and a series of detail pictures from the works of the old masters which illustrate the evolution of the violin. Then we had tea in an equally interesting dining room."

This was the year of Queen Victoria's diamond jubilee. One morning the columns of the *London Times* recorded a long list of names of those whom the queen delighted to honor,—there was no woman on this list, and but one woman was remotely alluded to. Doctor William Huggins was made a K.C.B. "for the eminent contributions to astronomical science which he had made with the colaboration of his accomplished wife." Lady Huggins, for such she then became, as it were by her own right, had great skill in guiding the telescope for long spectrum exposures, also in developing the plates, in discovering the sequence of spectrum plates, in framing new questions to put to nature and finally in putting the results of the Tulse Hill work before the world.

The writer once remarked to Lady Huggins her absence from some notable scientific gathering. "Oh, we never go anywhere," was her reply "Astronomy is a heart-breaking science in England. We get something on our plates between the clouds some night which opens up a great question, and then watch and wait for opportunity to answer it. Perhaps clouds compel us to wait weeks, perhaps even till another year."

In the cabinet with the memorial treasures has been placed Sir William Huggins' favorite life-verse which stood before him on his study table and which he delighted to give, especially to his younger friends.

"Then away with Longing, and ho for Labor!
And ho for Love—each one for his neighbor
For a life of Labor and Study and Love
Is a life that fits for the joy above."

Whitin Observatory, Wellesley College,
Wellesley, Mass.