RESULTS OF ASTRONOMICAL OBSERVATIONS MADE AT THE SYDNEY OBSERVATORY, NEW SOUTH WALES, IN THE YEARS 1877 AND 1878

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H. C. RUSSELL

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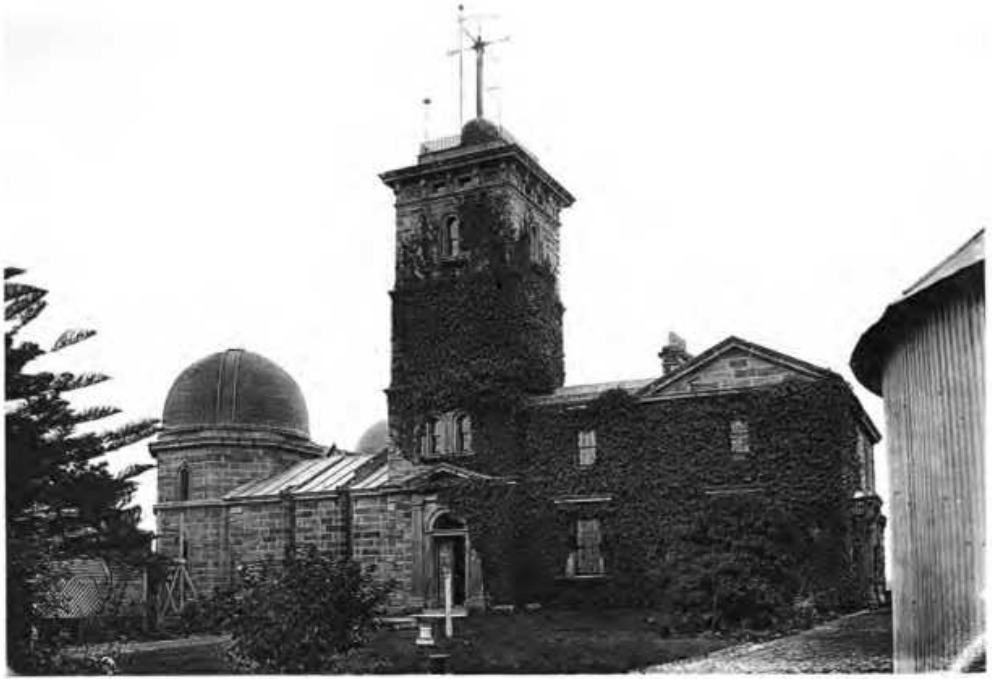

SYDNEY OBSERVATORY.

RESULTS

OF

ASTRONOMICAL OBSERVATIONS

MADE AT THE

SYDNEY OBSERVATORY,

NEW SOUTH WALES,

IN THE YEARS

1877 AND 1878,

UNDER THE DIRECTION OF

H. C. RUSSELL, B.A., F.R.A.S.,

GOVERNMENT ASTRONOMER FOR NEW SOUTH WALES.

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INTRODUCTION.

In the first volume of observations published by the Sydney Observatory will be found a description of the building and instruments in use at that time; but since then the former has been much enlarged, and the latter replaced by new and larger instruments. It seems therefore desirable to give in this first volume of observations made with new instruments some account of them and the building, so far at least as they affect the observations in this volume. The description of the large equatorial will be found in the volume of transit of Venus results, and those of the meteorological instruments scattered through the annual volumes, but principally in 1873–1878, and 1879.

SITUATION.

The site of the Observatory is the best that could have been chosen in Sydney, placed as it is on one of the many headlands projecting into the harbour; it is for that reason on the outskirts of the city, on the north side, and but few buildings can ever be made between it and the water, which surrounds it on three sides, east, west, and north; fortunately also it is on these sides that the prevailing winds blow, so driving away the smoke of the city, which lies to the south and south-east.

It will be seen in the map that the building is placed on the highest land of and near the centre of Flagstaff Hill Reserve, which has an area of 10 acres, and is planted with ornamental trees, and surrounded with stone wall and iron fence. The main floor is 152 feet above the mean sea-level, and the time-ball 61 feet above this, or 213 feet, which is high enough to be visible from the greater part of the harbour and city. The hill is solid sandstone, and affords therefore an admirable foundation.

PERSONAL ESTABLISHMENT.

The personal establishment of the Observatory in 1877 consisted of—

Mr. H. A. Lenehan, Astronomical Assistant.
Mr. E. G. Savage, Meteorological Assistant.
Mr. F. M. Bladen, in charge of Weather Map.

In 1878 this was increased by the employment of Mr. L. Hargrave as extra Observer.

The duties of the Observatory have been distributed in the following manner:—The Government Astronomer has taken the full direction and superintendence, together with the work of the large equatorial and all the correspondence.

Mr. Lenehan has general charge of the transit observations with their complete reduction, and all time signals.

Mr. Hargrave is charged with the examination of astronomical work, the computation of double star observations, and the work with No. 2 equatorial, together with some meteorological work.

Mr. Savage has charge of the reduction of the meteorological returns from country stations, and in part with the preparation of the daily weather map.

Mr. Bladen has charge of the meteorological observations at Sydney, and the daily preparation of the weather map.

BUILDINGS.

The photograph will give a better idea of the building than it would be possible to give here; suffice it to say that it is a good stone building. The eastern and southern sides of the quadrangle were built in 1856–7 and the western side (not seen, except part of the second dome) was built in 1877; this was a much needed extension, giving seven additional rooms, and a second dome which was placed so that from it that portion of the eastern heavens which the time-ball tower hides from the old equatorial room can be surveyed.

The instrument mounted here is the fine 7¼-inch Mery refractor, which was described in vol. for 1862; the old dome was described in the 1860 vol. In 1874 the old 18-feet dome was removed and a new one put in its place, to cover the 11½-inch equatorial. It is 22 feet in diameter, or as large as it could be made on the old walls. It is made of 26-ounce muntz metal or brass, and has no supporting ribs except two put on as guides for the shutters. In the course of construction each sheet was cut of the shape required for its position and then riveted in its place; the edges lapped one inch, and the rivets are 1½ inch apart. The opening for observations is two feet wide, and is covered with three sliding shutters and one on hinges at the bottom; these are so proportioned that any point from the horizon to the zenith can be seen. At the bottom it has a groove of cast-iron, and on the top of the wall is a similar groove. The radius of these grooves is somewhat greater than that of the five balls which roll between; this allows a little side motion, and makes the dome revolve easily—so easily indeed that when once in motion a good push will send it half a revolution. The new dome, 18 feet in diameter, is constructed in exactly the same way, but more care was taken in preparing the cast-iron groove and it works almost too freely, for it sometimes turns under the influence of the wind.

On the ground floor the building contains entrance hall, meteorological computing room, 15 × 15; type room, 9 × 12; transit room, 24 × 16.; Astronomer's room, 24 × 16; heliograph room in base of large tower; spectroscope room in base of north tower.

Partly underground are four rooms, making a standard bar room, printing room, magnetograph room* and store. Above the ground floor—photographic room, instrument store room, and three computing rooms. There are besides

* The magnetograph room is below the transit room and the instrument; a photographic one cannot now be used owing to the quantity of iron about the new transit instrument.

the two dome rooms and four rooms in the time-ball tower, the magnet house, a detached building on the north side, a carpenter's shop, and an instrument shop in a detached stone building.

INSTRUMENTS.

The telescope has an object-glass of 6½ inches, of which only 6 inches is clear; its focal length is 85 inches. Its tube is made of two cones of wrought brass made as light as was consistent with strength; the fittings of the object-glass and eye-piece are also as light as possible, and the large end of the cone, where it is attached to the axis cube, is turned under the ring of brass by means of which it is fixed to the axis. These precautions against flexure were taken at my request by Mr. Simms, with what effect will appear in another part of this introduction.

The axis is of gun-metal, and the central cube 13 inches on each side; the two cones are perfectly symmetrical both in outside form and in the inside strengthening braces, all being one splendid casting. So careful was Mr. Simms, that a first casting, which revealed a slight flaw when nearly finished was rejected, in order to secure one that was perfect. The bearings are steel cylinders 3½ inches in diameter (outside), turned to fit perfectly into the end of the gun-metal, and fixed by shrinking on the end of the gun-metal a steel ring half-inch thick and one inch wide; this has effectually fixed the steel bearings without the use of solder, which has more than once been found very unsatisfactory for this purpose.

The circles are discs of cast brass, supported on the back by radial arms; they are in fact exact copies in form of the splendid dividing engine circle in Mr. Simms's possession. This form was adopted so that the metal might flow evenly in the casting; and a disc without radial supports would have been chosen, but Mr. Simms could not guarantee that it would not twist after it was finished. The diameter is two