

To the ancients the magic number seven was established in the heavens by the existence of the sun, the moon, and the five planets; Mercury, Venus, Mars, Jupiter and Saturn. Copernicus heliocentric theory made the earth and the sun exchange places in this system, but it remained for Herschel to add another planet to the perfect number.

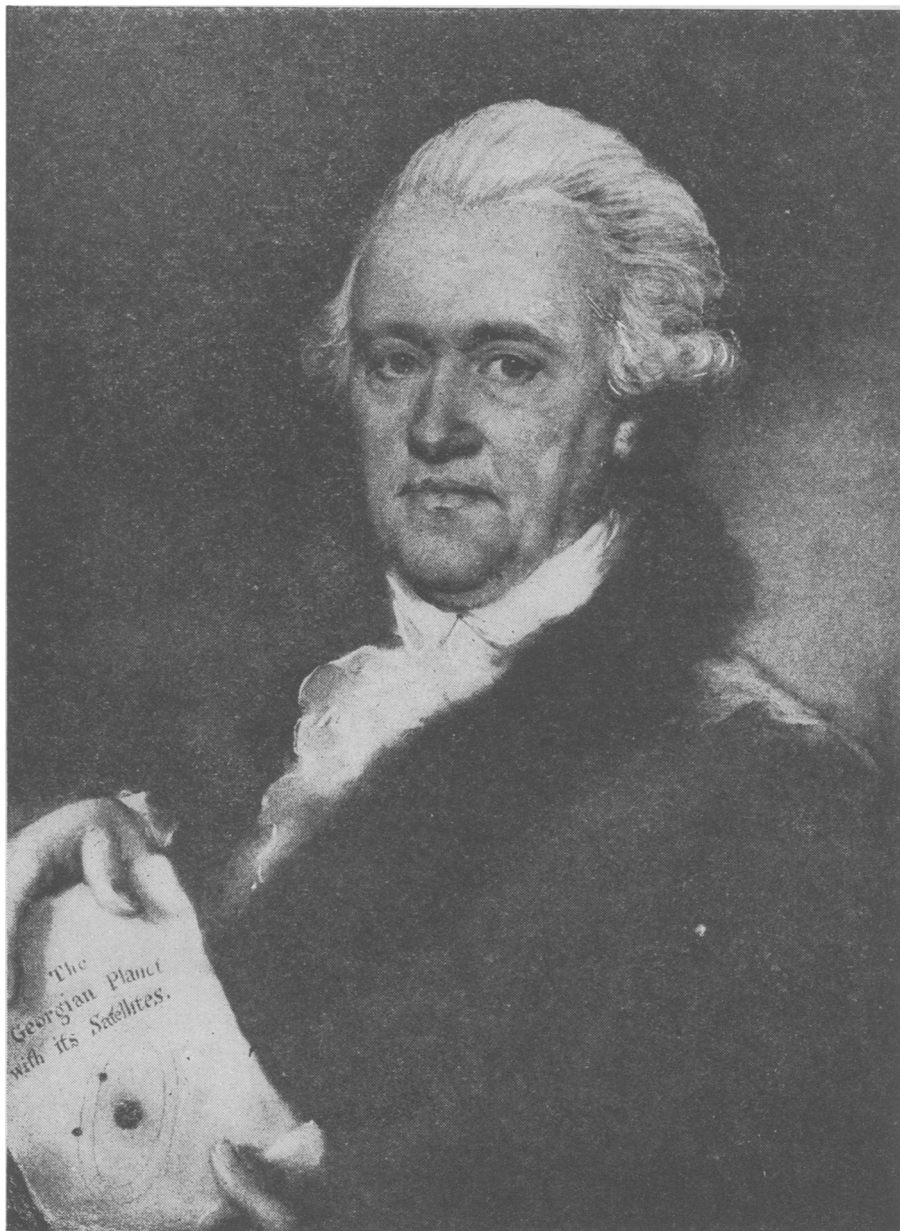
THE SCIENTIFIC PAPERS OF SIR WILLIAM HERSCHEL including early papers hitherto unpublished, collected and edited under the direction of a joint committee of the Royal Society and the Royal Astronomical Society. Vol. I, London, 1912.

Account of a Comet

Read April 26, 1781.

On Tuesday the 13th of March, between ten and eleven in the evening, while I was examining the small stars in the neighbourhood of H Geminorum, I perceived one that appeared visibly larger than the rest: being struck with its uncommon magnitude, I compared it to H Geminorum and the small star in the quartile between Auriga and Gemini, and finding it so much larger than either of them, suspected it to be a comet.

I was then engaged in a series of observations on the parallax of the fixed stars, which I hope soon to have the honor of laying before the Royal Society; and those observations requiring very high powers, I had already at hand the several magnifiers of 227, 460, 932, 1536, 2010, &c., all which I have successfully used upon that occasion. The power I had on when I first saw the comet was 227. From experience I knew that the diameters of the fixed stars are not proportionally magnified with higher powers, as the planets are; therefore I now put on the powers of 460 and 932, and found the diameter of the comet increased in proportion to the power, as it ought to be, on a supposition of its not being a fixed star, while the diameters of the stars to which I compared it were not increased in the same ratio. Moreover, the comet being magnified much beyond what its light would admit of, appeared hazy and ill-defined with these great powers, while the stars preserved that lustre and distinctness which from many thousand observations I knew they would retain. The sequel has shewn that my surmises were well founded, this proving to be the Comet we have lately observed. . . .



SIR WILLIAM HERSCHEL

A Letter from William Herschel, Esq. F. R. S. to Sir Joseph Banks, Bart.

P. R. S.

Sir,—By the observations of the most eminent Astronomers in Europe it appears, that the new star, which I had the honour of pointing out to them in March, 1781, is a Primary Planet of our Solar System. A body so nearly related to us by its similar condition and situation, in the unbounded expanse of the starry heavens, must often be the subject of the conversation, not only of astronomers, but of every

lover of science in general. This consideration then makes it necessary to give it a name, whereby it may be distinguished from the rest of the planets and fixed stars.

In the fabulous ages of ancient times the appellations of Mercury, Venus, Mars, Jupiter, and Saturn, were given to the Planets, as being the names of their principal heroes and divinities. In the present more philosophical æra, it would hardly be allowable to have recourse to the same method, and call on Juno, Pallas, Apollo, or Minerva, for a name to our new (*Turn to next page*)

Discovery of Uranus—Continued

heavenly body. The first consideration in any particular event, or remarkable incident, seems to be its chronology: if in any future age it should be asked, *when* this last-found Planet was discovered? It would be a very satisfactory answer to say, "In the Reign of King George the Third." As a philosopher then, the name of *Georgium Sidus* presents itself to me, as an appellation which will conveniently convey the information of the time and country where and when it was brought to view. But as a subject of the best of Kings, who is the liberal protector of every art and science;—as a native of the country from whence this Illustrious Family was called to the British throne;—as a member of that Society, which flourishes by the distinguished liberality of its Royal Patron;—and, last of all, as a person now more immediately under the protection of this excellent Monarch, and owing every thing to His unlimited bounty;—I cannot but wish to take this opportunity of expressing my sense of gratitude by giving the name *Georgium Sidus*,

Georgium Sidus

—*jam nunc assuesce vocari.*

VIRG. Georg.

to a star, which (with respect to us) first began to shine under His auspicious reign.

By addressing this letter to you, SIR, as President of the Royal Society, I take the most effectual method of communicating that name to the Literati of Europe, which I hope they will receive with pleasure. I have the honour to be, with the greatest respect,

SIR,

Your most humble
and most obedient servant,

W. HERSCHEL.

*An Account of the Discovery of
Two Satellites revolving
round the Georgian
Planet*

Read Feb. 15, 1787.

The great distance of the Georgian planet, and its present situation in a part of the zodiac which is scattered over with a multitude of small stars, has rendered it uncommonly difficult to determine whether, like Jupiter and Saturn, it be attended by satellites. In pursuit of this inquiry, having frequently directed large telescopes to

this remote planet, and finding myself continually disappointed, I ascribed my failure to the want of sufficient light in the instruments I used; and, for a while, gave over the attempt.

In the beginning of last month, however, I was often surprised when I reviewed nebulae that had been seen in former *sweeps*, to find how much brighter they appeared, and with how much greater facility I saw them. The cause of it could be no other than the quantity of light that was gained by laying aside the small speculum, and introducing the *Front-view*; an account of which has been inserted, by way of note, to the Catalogue of Nebulae contained in the *Philosophical Transactions*, vol. LXXVI, p. 499.

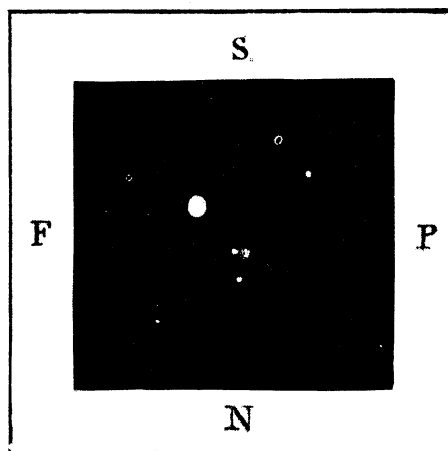
It would not have been pardonable to neglect such an advantage, when there was a particular object in view, where an accession of light was of the utmost consequence; and I wondered why it had not struck me sooner. The 11th of January, therefore, in the course of my general review of the heavens, I selected a *sweep* which led to the Georgian planet; and, while it passed the meridian, I perceived near its disk, and within a few of its diameters, some very faint stars whose places I noted down with great care.

The next day, when the planet returned to the meridian, I looked with a most scrutinizing eye for my small stars, and perceived that two of them were missing. Had I been less acquainted with optical deceptions, I should immediately have announced the existence of one or more satellites to our new planet; but it was necessary that I should have no doubts. The least haziness,

otherwise imperceptible, may often obscure small stars; and I judged, therefore, that nothing less than a series of observations ought to satisfy me, in a case of this importance. To this end I noticed all the small stars that were near the planet the 14th, 17th, 18th, and 24th of January, and the 4th and 5th of February; and though, at the end of this time, I had no longer any doubt of the existence of at least one satellite, I thought it right to defer this communication till I could have an opportunity of seeing it actually in motion. Accordingly I began to pursue this satellite on February the 7th, about six o'clock in the evening, and kept it in view till three in the morning on February the 8th; at which time, on account of the situation of my house, which intercepts a view of part of the ecliptic, I was obliged to give over the chase: and during those nine hours I saw this satellite faithfully attend its primary planet, and at the same time keep on, in its own course, by describing a considerable arch of its proper orbit.

While I was chiefly attending to the motion of this satellite, I did not forget to follow another small star, which I was pretty well assured was also a satellite, especially as I had, on the night of the 14th of January, observed two small stars which were wanting the 17th, and again missed other two the 24th which had been noticed the 18th; but, whether owing to my great attention to the former satellite, or to the closeness of this latter, which was nearly hidden in the rays of the planet, I could not be well assured of its motion. Indeed, towards morning, when a change of place, in so considerable an interval as nine hours, would have been most conspicuous, the moon interfered with the faint light of this satellite, so that I could no longer perceive it.

The first moment that offered for continuing these observations was on February the 9th, when I saw my first discovered satellite nearly in the place where I expected to find it. I perceived also, that the next supposed satellite was not in the situation where I had left it on the 7th, and could now distinguish very plainly that it had advanced in its orbit, since that day, in the same direction with the other satellite, but at a quicker rate. Hence it is evident, that it (*Turn to next page*)



HERSCHEL'S DIAGRAM

Ant Mound Has 8,239 Inhabitants

Entomology

When the 1930 U. S. Census gets under way it will take in many kinds of live stock, but will perforce have to omit many other kinds, important though these may be in the economic life of our country; among these, ants. The importance of the ant is conceded without argument, especially on picnics and in pantries. But counting the ant population is too much of a job.

Except when a university professor really gets his curiosity aroused. Prof. A. E. Andrews, of the Johns Hopkins University, did not wait for the census year, but made a count of the six-legged citizens of a good-sized ant mound near Baltimore last fall and this spring. In the forthcoming issue of the *Quarterly Review of Biology* he tells of his findings.

The census involved the destruction of the mound, for the ants were so active during warm weather that it was necessary to wait until autumnal

chill had stupefied the insects. Then the mound was carefully picked to pieces and most of the ants removed and counted. The task was completed during the following spring.

A total of 8,239 ants were found in the galleries of the earthwork. Prof. Andrews thinks this represents a fair average for an ordinary ant mound of the species examined. Some European counts have shown three times that many, but other estimates, running as high as half a million ants per mound, he thinks are too high.

In one forested area in Baltimore County, Prof. Andrews counted 200 ant mounds, and in another place, near Washington, 989 mounds. Allowing an average population of 10,000 ants per mound, the first colony would comprise a total of about 2,000,000 insects, and the second something over 8,000,000. Inasmuch as this species is accused of harming young trees, the existence of the ants in such large numbers becomes a matter of economic moment.

Deafness Traced

Medicine

Diseased ear conditions that cause deafness are usually due to disease in the nose, Dr. Edmund P. Fowler of New York declared in a report of clinical investigations at the Manhattan Eye, Ear and Throat Hospital.

Speaking before the American Federation of Organizations for the Hard of Hearing, Dr. Fowler also stated that variations in deafness, that is, improved or diminished hearing, have been found to be closely associated with improvement or deterioration in the nasal disease conditions.

X-ray examinations of a large number of children attending the clinic on ear diseases revealed pathological conditions in the nasal sinuses, he explained. Treatment of this condition resulted in improving the hearing of more than 50 per cent. of the usual chronic cases of deafness in these children, and in 25 per cent. the improvement is marked.

The children's hearing has been tested from time to time and X-ray examinations have been made.

Science News-Letter, June 29, 1929

Herschel Discovers Uranus—Continued

moves in a more contracted orbit; and I shall therefore call it in future the first satellite, though last discovered, or rather last ascertained; since I do not doubt but that I saw them both, for the first time, on the same day, which was January the 11th, 1787.

I now directed all my attention to the first satellite, and had an opportunity to see it for about three hours and a quarter; during which time, as far as one might judge, it preserved its course. The interval which the cloudy weather had afforded was, however, rather too short for seeing its motion sufficiently, so that I deferred a final judgment till the 10th; and, in order to put my theory of these two satellites to a trial, I made a sketch on paper, to point out before-hand their situation with respect to the planet, and its parallel of declination.

The long expected evening came on, and, notwithstanding the most unfavourable appearance of dark weather, it cleared up at last. And the heavens now displayed the original of my drawing, by shewing in the situation I had delineated them, *The Georgian Planet attended by two Satellites.*

I confess that this scene appeared

to me with additional beauty, as the little secondary planets seemed to give a dignity to the primary one, which raises it into a more conspicuous situation among the great bodies of our solar system.

For upwards of five hours I saw them go on together, each pursuing its own track; and I left them situated, about two o'clock in the morning on February the 11th, as they are represented in the figure, fig. 1. The letters S. N. P. F, denote the south, north, preceding and following parts of the heavens, as they are seen, by the *front-view*, in my telescope. The south preceding satellite is the second, or that whose motion was first ascertained; the other is that which moves in a smaller orbit, or what I have called the first satellite; and the direction of their motion is according to the order P, S, F, N, of the letters.

I have not seen them long enough to assign their periodical times with great accuracy; but suppose that the first performs a synodical revolution in about eight days and three-quarters, and the second in nearly thirteen days and an half.

Their orbits make a considerable angle with the ecliptic; but to assign

the real quantity of this inclination, with many other particulars, will require a great deal of attention, and much contrivance: for, as estimations by the eye cannot but be extremely fallacious, I do not expect to give a good account of their orbits till I can bring some of my micrometers to bear upon them; which, these last nights, I have in vain attempted, their light being so feeble as not to suffer the least illumination, and that of the planet not being strong enough to render the small silk-worm's threads of my delicate micrometers visible. I have, nevertheless, several resources in view, and do not despair of succeeding pretty well in the end.

W. HERSCHEL.

Slough, near Windsor,

February 11, 1787.

Frederick William Herschel (1738-1822) by the time he had reached his early thirties was a famous organist and composer in Bath, England, having migrated there from his home in Hanover, Germany. From harmony his studies led him to astronomy. With telescopes of his own making he set out upon a comprehensive survey of the heavens. In the course of his observations he discovered the object, at first thought to be a comet, which proved to be the first member of our family of planets to be discovered within historic time.

Science News-Letter, June 29, 1929