THURSDAY, MARCH 17, 1881

SIR WILLIAM HERSCHEL[1]

II.

HERSCHEL'S removal from Bath to Datchet appears to have been brought about by the unwillingness he felt, at the time of his visit to London, to continue the toils of teaching, which, with the tastes he had now formed, his sister tells us, "appeared to him an intolerable waste of time," and he chose rather the alternative of a salary of 200*l.* from the king. "Never bought monarch honour so cheap!" exclaimed his friend Sir Thomas Watson, to whom alone the sum was mentioned, all other inquirers being simply assured that "the king had provided for him." From letters received by the family at Bath during Herschel's stay in London, they had been led to infer that the king would not suffer him to return to his profession again. Herschel took part in the musical service at St. Margaret's Chapel at Bath for the last time on Whit-Sunday, 1782, when the anthem for the day was of his own composition.

On August 1 he arrived at Datchet. "The new home was a large neglected place, the house in a deplorably ruinous condition, the garden and grounds overgrown with weeds." But these circumstances had no effect upon him: there was a laundry which would serve as a library, and roomy stables which were just suitable for the grinding of mirrors, and a grass-plot where "the small twenty-foot" could be erected. Under such conditions the end of the introductory epoch of his life, as Prof. Holden expresses it, was reached: henceforth he lived in his observatory, rarely leaving it, from his forty-fourth year onwards, except for short periods to submit his classic memoirs to the Royal Society, and even selecting for such visits periods when moonlight interfered with the work of the telescope. We are told that much of his time was occupied, soon after he was settled at Datchet, in going to the Queen's Lodge, to show objects through the 7-feet reflector to the king and Court, but "when the days began to shorten, this was found impossible, for the telescope was often (at no small expense and risk of damage) obliged to be transported in the dark back to Datchet, for the purpose of spending the rest of the night with observations on double stars for a second catalogue."

In his paper entitled "An Account of Three Volcanoes in the Moon," communicated to the Royal Society in 1787, Herschel refers to previous observations of a similar kind, and Prof. Holden gives a translation of a letter written by Baron de Zach, from London, to Bode, the editor of the *Berliner Jahrbuch*, in which these observations are mentioned. An occultation of a star at the moon's dark limb was to take place on the evening of May 4, 1783, and was observed by Herschel and Dr. Lind, a physician in Windsor. Mrs. Lind also placed herself at a telescope to watch the phenomenon. "Scarcely had the star disappeared before Mrs. Lind thought she saw it again, and exclaimed that the star had gone in front of, and not behind, the moon. This provoked a short astronomical lecture on the question, but still she would not credit it, because she *saw* differently. Finally Herschel stepped to the telescope, and in fact he saw a bright point on the dark disk of the moon, which he followed attentively. It gradually became fainter, and finally vanished." . . . Zach professes to report what actually fell from Herschel's lips: Mrs. Lind's observation might be supposed to refer to the apparent projection of a star upon the moon's dark limb, of which we have other instances, but that after an astronomical lecture, however brief, Herschel should have looked into the telescope and still found the same bright point is hardly reconcilable with this explanation: and further if there was no misapprehension of Herschel's words on Zach's part, he seems to have ascribed the appearance to a lunar volcano.

In 1783 Herschel married a daughter of Mr. James Baldwin, a merchant of the City of London, and the widow of Mr. John Pitt: she was entirely interested in his scientific pursuits, and brought him a considerable jointure. Their only child was John Frederick William, born March 7, 1792.

Writing in 1783, Herschel says he had finished his third review of the heavens, which was made with the same instrument as the second, but with the power increased from 227 to 460. It extended to all the stars of Flamsteed's Catalogue, "together with every small star about them to the amount of a great many thousands of stars." He tells us of this third review, that he had "many a night, in the course of eleven or twelve hours of observation, carefully and singly examined not less than 400 celestial objects, besides taking measures, and sometimes viewing a particular star for half an hour together." The summer months of 1783 were occupied in energetic efforts to get the large 20-feet reflector ready for observations during the ensuing winter, and with success; the sweeps for the fourth review of the heavens were commenced before the end of the year. Caroline Herschel relates that at the end of 1783 her search for comets and nebulæ was interrupted to write down her brother's observations with the large 20-foot, and states that in the early use of so cumbrous an instrument and its appurtenances in the open air, she could give "a pretty long list of accidents" which were near proving fatal to her brother or to herself.

In the long days of the ensuing summer months many 10- and 7-feet mirrors were finished. Prof. Holden mentions that in 1785 the cost of a 7-feet telescope, six and four-tenths inches aperture, stand, eyepieces, &c., complete, was 200 guineas, and a 10-feet was 600 guineas. A 20-feet telescope would cost from 2500 to 3000 guineas. Herschel made four 10-feet telescopes for the king, one of which was delivered in July, 1786, as a present from the king to the Observatory of Göttingen. Later a 7-feet telescope complete was sold for 100 guineas. For a 10- and a 7-feet telescope the Prince of Canino paid 231*l.*

Prof. Holden reproduces a letter addressed to Bode about this time by De Magellan, which appeared in the *Jahrbuch* for 1788, from which we make one or two extracts. He writes:—"I spent the night of the 6th of January at Herschel's at Datchet, near Windsor, and had the good luck to hit on a fine evening. He had his 20-foot Newtonian telescope in the open air and mounted in his garden very simply and conveniently. It is moved by an assistant who stands below it. . . . In the room near it

[1] Continued from p. 431.

sits Herschel's sister, and she has Flamsteed's Atlas open before her. As he gives her the word she writes down the declination and right ascension, and other circumstances of the observation. In this way Herschel examines the whole sky without omitting the least part. . . . He has already found about 900 double stars and almost as many nebulæ. I went to bed about one o'clock, and up to that time he had found that night four or five new nebulæ. The thermometer in the garden stood at 13° Fahrenheit, but in spite of this Herschel observes the whole night through, except that he stops every three or four hours and goes in the room for a few moments. For some years Herschel had observed the heavens every hour when the weather is clear, and this always in the open air, because he says that the telescope only performs well when it is at the same temperature as the air. . . . He has an excellent constitution, and thinks about nothing else in the world but the celestial bodies."

An account of the discoveries made with the 20-feet instrument and the improvements effected in its mechanical parts during the winter of 1785 is given with the catalogue of the first 1000 new nebulæ in the *Phil. Trans.* 1786. The house at Datchet being found to be more and more unfit for the requirements of the family, Herschel removed in June 1785 to Clay Hall in Old Windsor, but here "a litigious woman" for a landlady brought unlooked-for troubles, and on April 3, 1786, the house and garden at Slough were taken, and all apparatus and machinery immediately removed there. "The last night at Clay Hall was spent," as Caroline Herschel records, "in sweeping till daylight, and by the next evening the telescope stood ready for observation at Slough." Here Herschel resided for thirty-six years, or from 1786 until his death. As Arago has said of this spot, "On peut dire hardiment du jardin et de la petite maison de Slough, que, c'est le lieu du monde où il a été fait le plus de découvertes. Le nom de ce village ne périra pas; les sciences le transmettront réligieusement à nos derniers neveux."

On January 11, 1787, Herschel discovered two satellites to the planet Uranus, and Prof. Holden relates, before making known his discovery to the world, he satisfied himself by this crucial test: he prepared a sketch of Uranus attended by his two satellites, as it would appear on the night of February 10, 1787, and when the night came "the heavens displayed the original of my drawings, by showing, 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 the solar system." In the subsequent announcement of the discovery of four additional satellites of Uranus it is now generally conceded that Herschel was misled by minute stars: his American biographer indeed conjectures that he may have seen *Ariel* on March 27, 1794, and *Umbriel* on April 17, 1801, but however this may be, the discovery of these satellites in the strict sense of the term is considered due to the late Mr. Lassell, who, from repeated observations, was enabled to assign their periods of revolution and mean distances from the primary.

Herschel dates the completion of the celebrated 40-feet reflector from August 28, 1789, when he writes: "Having brought the instrument to the parallel of Saturn I discovered a *sixth* satellite to that planet, and also saw Saturn better than I had ever seen them before." On September 17 following a *seventh* satellite was discovered with the same instrument, of which we shall have occasion to say more, when we come to treat of the subjects included in Prof. Holden's last chapter.

Although Herschel's relations with his contemporaries were usually of the most pleasant kind, there were several occasions upon which he appears to have been somewhat irritated by their comments respecting his work and writings, as in the case of the discovery, or rather supposed discovery, of mountains of great elevation upon the planet Venus, claimed by Schröter of Lilienthal, and described in a paper which appeared in the *Phil. Trans.* for 1792. Herschel's memoir, "Observations on the Planet Venus," in the *Phil. Trans.* of the following year, is viewed by Holden as intended far more as a rejoinder for detractors at home than for the astronomer abroad. At this time he considers there certainly existed a feeling that Herschel undervalued the labours of his contemporaries, an impression no doubt fostered by his general habit of not quoting previous authorities in the fields in which he was working: but he is nevertheless of opinion that "his definite indebtedness to his contemporaries was vanishingly small." The work of Michell and Wilson he always mentioned with appreciation. Some annoyance may have been evinced that the papers of Christian Mayer, "De novis in cœlo sidereo phenomenis" (1779), and "Beobachtungen von Fixterntrabanten" (1778), should have been quoted to prove that the method which he had proposed in 1782 for determining the parallax of the fixed stars should not have entirely originated with himself, but his biographer affirms that in the Memoir of Caroline Herschel there is direct proof that it did so, and further it is shown in his Catalogue of Double Stars. His proposal to call the minor planets detected by Piazzi and Olbers (*Ceres* and *Pallas*) *asteroids* also led to much criticism, and Prof. Holden transfers from the first volume of the *Edinburgh Review* part of an article on the subject, as it is remarked, "simply to show the kind of envy to which even he, the glory of England, was subject."

In the Diary and Letters of Madame D'Arblay we find various personal reminiscences of visits paid to Herschel both by herself and Dr. Burney between 1786 and 1799. In 1793 Herschel was a witness for his friend James Watt in the case of Watt *v.* Bull, tried in the Court of Common Pleas, and it appears that he visited Watt at Heathfield in 1810. In the "Life and Letters of Thomas Campbell," edited by William Beattie, is published a letter from the poet, describing his meeting with Herschel in September, 1813. "His simplicity, his kindness, his anecdotes," writes Campbell, "his readiness to explain—and make perfectly conspicuous too—his own sublime conceptions of the universe are indescribably charming. He is seventy-six, but fresh and stout; and there he sat, nearest the door, at his friend's house, alternately smiling at a joke, or contentedly sitting without share or notice in the conversation. Any train of conversation he follows implicitly; anything you ask he labours with a sort of

boyish earnestness to explain." Campbell relates that he was anxious to get from him as many particulars as he could, respecting his interview with Buonaparte, when First Consul, who, it had been reported, had astonished him by his astronomical knowledge. This interview must have taken place in 1802, his sister's Memoir recording that he left Slough on July 13 in that year to go to Paris, returning on August 25 with his son (who had accompanied him) dangerously ill. The result of Campbell's inquiries was hardly confirmatory of the reports which were prevalent. "The First Consul," he said, "did surprise me by his quickness and versatility on all subjects; but in science he seemed to know little more than any well-educated gentleman, and of astronomy much less for instance than our own king. His general air was something like affecting to know more than he did know." There would seem to be no other record of this interview; Lalande, gossip that he was, has no reference in his notes for 1802 to Herschel's visit to Paris, though he, in common with other French astronomers, as Cassini, Mechain, Legendre, had visited at Slough, and might be supposed to be interested in Herschel's return-visit to the French capital. In a letter to Alison, written in December, 1813, Campbell reverts to the pleasure which the day spent with Herschel had afforded him; in this letter he repeats it was "not true, as reported, that Buonaparte understood astronomical subjects deeply, but affected more than he knew."

The occurrences of the later years of Herschel's life are very briefly noticed by Prof. Holden. All through the years 1814-1822 his health was very feeble. The severe winter of 1813-14 told materially upon him. In 1814 he attempted to re-polish the mirror of the 40-feet telescope, but was obliged to give up the work. He found it necessary to make frequent excursions for change of air and scene. In December, 1818, he went to London to have his portrait painted by Artaud, and while there his will was made. Particulars of the will appeared in the *Gentleman's Magazine* for 1822, p. 650; the instruments, telescopes, observations, &c., were given, on account of his advanced age, to his son for the purpose of continuing his studies. "It is not necessary to say how nobly Sir John Herschel redeemed the trust confided to him. All the world knows of his Survey of the Southern Heavens, in which he completed the review of the sky which had been begun and completed for the northern hemisphere by the same instruments in his father's hands." During the next three years the time he was able to spend in work was devoted to putting his papers in order, but he was daily becoming more and more feeble.

Herschel died on August 22, 1822, at the age of eighty-four years. He was buried in the church of St. Lawrence at Upton, near Slough, and a memorial tablet was placed over his grave with an epitaph which some have ascribed to the late Dr. Whewell, others to a Provost of Eton, with three lines from which we may close the present notice, reserving for a concluding article the consideration of the scientific labours of William Herschel, which forms the subject of Prof. Holden's last chapter.

"*Novis artis adjumentis innixus*
Quæ ipse excogitavit et perficit
Cœlorum perrupit claustra."

J. R. HIND

A POLAR RECONNAISSANCE

A Polar Reconnaissance: being the Voyage of the "Isbjörn" to Novaya Zemlya in 1879. By Albert H. Markham, F.R.G.S., Captain R.N. Maps and Illustrations. (London: Kegan Paul and Co., 1881.)

A "RECONNAISSANCE" in military parlance is, we understand, a preliminary to a serious attack in full force; and in this sense Capt. Markham evidently uses it in the work before us. Had we any doubt of this, on a perusal of Capt. Markham's story of his summer cruise, the preface by Mr. C. R. Markham would set that doubt at rest. But indeed the whole tone of the volume bears on the resumption by Government of the search for the Pole, and Mr. Markham's preface is essentially a catalogue of the qualifications of the Captain for the command of an Arctic expedition. Apart from the questionable taste of this preface and the unpleasant feeling that the book as a whole has been written with a purpose, most of those who are competent to form an opinion will agree with us that in this direction Capt. Markham's work is premature. There is, we are glad to think, little chance of any Government Polar Expedition being sent out for a long time to come. No good could accrue to either science or navigation from an expedition similar to our last expensive failure, and even the additions to mere geography could be of the most trivial importance. While we should be glad enough to see the whole of the Polar area explored, and to know whether the "apex of the world" is land or water, we are content to wait until polar problems of much greater scientific importance are solved. The result of Sir George Nares's expedition has been to compel the enthusiasts on behalf of the Smith Sound Route to abandon it as hopeless, and seek for some other gateway to the Pole. In this it may be found they have been too hasty, for indeed our knowledge of the conditions of the Polar area is of the scantiest. The expedition sent out in the *Jeannette* by Mr. Gordon-Bennett has been given up by many for lost; though we are glad to learn that the U.S. Government have resolved to send out a search expedition. Within recent years the route by Franz-Josef Land has become a favourite with many, though why this should be so it is difficult to fathom, seeing that we know scarcely anything about it. It was discovered six years ago by the Payer-Weyprecht expedition, and since then it has been twice visited—by the *Willem Barents* in 1879, and by Mr. Leigh Smith in his yacht last year. Mr. Smith, as we showed at the time of his return, did some excellent work, having traced the land to a considerable distance to the north-west. He returns again next summer, and we trust he will be able to add still farther to our knowledge not only of the land itself, but of its physical and biological conditions, past and present. One or two enthusiasts who hail the discovery of a barren Arctic islet as if it were a new world, have rushed to the conclusion that Franz-Josef Land would form an excellent basis from which to storm the Pole. But we consider it useless to discuss the question. In a recent article we showed that in every country but our own scientific geographers have come to the conclusion that a mere search for the Pole is a wanton waste of resources, and that the only effective method of adding to our knowledge of the Polar area is by a series of observations continued over several years carried on at