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Challis, James

(*b*. Braintree, Essex, England, 12 December 1803; *d*. Cambridge, England, 3 December 1882),

astronomy.

The fourth son of John Challis, James received his early training in a private school at Braintree run by the Reverend Daniel Copsey, who recognized his potential and secured him a place at Mill Hill School, near London. He entered Trinity College, Cambridge, in 1821 as a sizar and graduated as senior wrangler and first Smith prizeman in 1825. Elected a fellow of Trinity in 1826, he resided there until ordained in 1830, when he took up the college living of Papworth Everard. He vacated his fellowship in 1831 by marrying the widow of Daniel Copsey, daughter-in-law of his early patron. He was reelected a fellow of Trinity in 1870 and retained his fellowship until his death.

When George Biddell Airy was elected astronomer royal in 1835, he was succeeded as Plumian professor and director of the Cambridge Observatory by Challis, who took up residence in 1836. Challis was succeeded at the observatory by John Couch Adams in 1861 but retained the Plumian chair until his death.

Challis was a spectacular failure as a scientist, and ironically, this failure has immortalized him. His most distinguished contemporaries reacted to the peculiarity of his scientific views, and he was saved from intellectual ostracism only by his amiability. Although he possessed very little physical sense, he nevertheless claimed to have proved a far wider generalization than that shown earlier by Isaac Newton. In a work published privately in 1869, entitled *Notes on the Principles of Pure and Applied Calculation: and Application of Mathematical Principles to Theories of the Physical Forces*, he attempted to show that all physical phenomena are mathematically deducible from a few simple laws. At a later time, or under less amiable circumstances, he would have been branded a charlatan. He would now be as forgotten as his peculiar ideas had not the events surrounding the discovery of Neptune in 1845 given him a genuine opportunity for scientific immortality. But he fumbled it.

John Couch Adams had approached Challis in 1844 to help him obtain from Airy the errors in the motion of the planet Uranus, which had been under observation for some time at the Greenwich Observatory. He needed these to predict the orbit of an unknown planet that might be perturbing the orbit of Uranus. After computing the orbit of the new planet, Adams presented Challis in September 1845 with some predictions as to where it might be found. By July 1846 Airy was pressing Challis very hard to begin a search for the planet because the Northumberland equatorial telescope at Cambridge was the best instrument for the task and

because Continental astronomers were pressing the search, using the predictions of the French mathematician J. Leverrier, which were similar to those of Adams. He offered to supply Challis with an assistant for the purpose but Challis apparently misunderstood the offer and rebuffed him with the words "I understand your proposal [of supplying an assistant] to be made on the supposition that I decline undertaking the search myself" (Challis to Airy, 18 July 1846).

The subsequent history of the discovery is detailed more fully elsewhere in the *Dictionary* in the articles on John Couch Adams, Leverrier, and Airy, but Challis' contribution and his failure are well summarized in his letter to Airy of 12 October 1846 (the italics are mine):

I had heard of the discovery of the planet on Oct. 1. I have been greatly mortified to find that my observations would have shewn me the planet in the early part of August if I had only discussed them. I commenced observing on July 29, attacking first of all, as it was prudent to do, the position which Mr. Adams' calculations assigned as the most probable place of the Planet. On July 30… I took all the stars to the 11th magnitude in a zone 9? in breadth…. On account of moonlight I did not observe again till Aug. 12. On that day I went over again the zone of 9? breadth which I examined on July 30… on comparing the observations of those two days I found that the zone of July 30 contained every star in the corresponding position of the zone of Aug. 12 except one star of the 8th magnitude. This… must have been a Planet. By this statement you will see that after four days of observing the Planet was in my grasp if only I had examined or mapped the observations. I delayed doing this partly because I thought the probability of discovery was very small till a much larger portion of the heavens was scrutinized, *but chiefly because I was making a grand effort to reduce the vast numbers of comet observations which I have accumulated and this occupied the whole of my time*.

The judgment on Challis by history and by his more objective contemporaries is expressed by H. C. Schumacher, Danish astronomer and founder-editor of the *Astronomische Nachrichten*, in a letter to Airy dated 24 October 1846:

I scarcely know what I shall say about Mr. Challis. He sees the great probability that the predicted planet must exist by the near coincidence of two totally independent predictions. You request sweeps with the Northumberland equatorial from him. He makes such sweeps on July 30 and Aug. 12, but lays them aside without looking at them. Now such observations are only made to see if a star has changed its relative place to the others. First when he hears that the new planet has been observed Sept. 23 at Berlin he examined his observations made nearly two months before, and lo! the planet is observed Aug. 12 and so would have asserted the honour of one of the most brilliant discoveries to his Nation, to his University and to his Observatory.

Olin J. Eggen