

not merely by the position of the iris (or colored circle) and whites of these eyes, but likewise by the direction of the concurrent features, particularly those which are more prominent, as the nose and forehead. However unexpected this statement may be, or perplexing the explanation of it, Wollaston puts it out of the power of the least credulous of his readers to deny the facts, by the plates which accompany his paper. In these he shows that the same pair of eyes may be made to look up, or down, or to either side, merely by altering the direction of the nose and forehead which accompany them. In this paper, also, he supplies an explanation of the familiar fact, that "if the eyes of a portrait look at the spectator placed in front of the picture, they appear to follow him in every other direction."

One other reference will conclude our discussion of Wollaston's essays. The last paper we mention is, "On Sounds inaudible to certain ears." Its object is to point out, that while in the natural healthy state of the ear, there seems to be no limit to the power of discerning low sounds, in many persons who are otherwise quite free from deafness, there exists a total insensibility to high or shrill notes, so that they are quite deaf to these. The hearing of different persons was found by Wollaston to terminate at a note four or five octaves above the middle E of the pianoforte. His own hearing ceased at six octaves above that note. Those who were thus deaf to high notes were, in consequence, quite insensible to the chirping of the grasshopper, the cricket, the sparrow, and the bat. With these observations, Wollaston connects a beautiful speculation as to the possibility of insects both emitting and listening to shrill sounds, which we never hear; whilst they, in like manner, are totally deaf to the graver notes which only affect our ears.

This seems to us a striking and beautiful idea, and suggests many thoughts. It is in a fine sense a fulfilment of St. Paul's declaration, "There are, it may be, so many kinds of voices in the world, and none of them is without signification."

Towards the latter part of the year 1828, Wollaston became dangerously ill of the disease of the brain, of which he died. Finding himself unable to write out an account of such of his discoveries and inventions as he was reluctant should perish with him, he spent his numbered hours in dictating to an amanuensis an account of some of the more important of them. These parting gifts of a dying philosopher to his brethren will be found in the papers bearing his name which are printed in the *Philosophical Transactions* for 1829.

These were not his only legacies to science. Shortly before his death, he wrote a letter to the secretary of the Royal Society, informing him that he had that day invested, in the name of the society, stock to the amount of £1000. The interest of this money he wished to be employed in the encouragement of experiments in natural philosophy. A Wollaston medal is accordingly given periodically by the Royal Society.

In the June before his death, he was proposed as a member of the Astronomical Society of London; but, according to the rules of that body, he could not have been elected before their last meeting for the year. When the society met in November, 1828, however, the alarming situation of his health, and the great probability of his dissolution previous to the December meeting, induced the council at once to recommend to the assembled members a departure from the established rule, and that the election should take place at that sitting. This was done, and received the unanimous sanction of the meeting, which insisted on dispensing with even the formality of a ballot. Dr. Wollaston, then within a few days of his death, acknowledged this feeling and courteous act by presenting the society with a valuable telescope which he greatly prized. It originally belonged to his father, and had been subsequently improved by the application to it of an invention of his own, that of the triple achromatic glass, a device on which astronomers set great value.

It is impossible to turn from the record of these incidents, without a feeling of strong admiration of the old Roman-like resolution and calm courage with which the suffering philosopher waited for death. When he was nearly in the last agonies, one of his friends having observed, loud enough for him to hear, that he was not at the time conscious of what was passing around him, he immediately made a sign for a pencil and paper, which were given him. He then wrote down some figures, and, after casting up the sum, returned them. The amount was right. He died on the twenty-second of December, 1828, aged sixty-two, a few months before his great scientific contemporaries, Sir Humphrey Davy and Dr. Thomas Young. After death it appeared that that portion of the brain from which the optic nerve arises was occupied by a large tumor. If we are right in thinking that the singular one-sided blindness from which he sometimes suffered was an early symptom of this malady, it must have proceeded very slowly, for his paper on the semi-decussation of the optic nerves was published in 1824. It is interesting for the sake of psychology to know, that in spite of the extensive cerebral disease referred to, Wollaston's faculties were unclouded to the last.

There remains but little to be told. No picturesque incidents or romantic stories adorn Wollaston's biography, and but few character-

istic anecdotes have been preserved. His days were spent with entire devotion to science, between his laboratory and his library.

His reluctance, or rather positive refusal, to admit even friends to his laboratory has already been referred to. Plato is said to have written above the door of his study, "Let no one who is not a mathematician enter." Had Wollaston placed an inscription, or rather a proscription above the door of his laboratory, it would have been still more brief and comprehensive, "Let no one enter." This hermetically sealed laboratory was known to have been of small dimensions.

Dr. Paris mentions, in his life of Davy, that a foreign philosopher once called upon Dr. Wollaston with letters of introduction, and expressed an anxious desire to see his laboratory. "Certainly," he replied; and immediately produced a small tray containing some glass tubes, a blow-pipe, two or three watch-glasses, a slip of platina, and a few test-tubes. It is added by the same gentleman, that Wollaston appeared to take great delight in showing by what small means he could produce great results. Shortly after he had inspected the grand galvanic battery constructed by Mr. Children, and had witnessed some of those brilliant phenomena of combustion which its powers produced, he accidentally met a brother chemist in the street. Seizing his button (his constant habit when speaking on any subject of interest) he led him into a secluded corner, when, taking from his waistcoat pocket a tailor's thimble, which contained a galvanic arrangement, and pouring into it the contents of a small vial, he instantly heated a platina wire to a white heat.

That he did not selfishly hoard his money may be gathered from the following anecdote, which is declared to be authentic. Having been applied to by a gentleman, who was involved by unexpected difficulties, to procure him some government situation, Dr. Wollaston's reply was—"I have lived to sixty without asking a single favor from men in office, and it is not after that age that I shall be induced to do so, even were it to serve a brother. If the enclosed can be of use to you in your present difficulties, pray accept it, for it is much at your service." The enclosed was a cheque for ten thousand pounds.

Wollaston and Davy were contemporaries and friends. It is difficult to imagine a greater contrast than that between the eager, imaginative poet-chemist, on the one hand, and the austere, unimpassioned, monk-philosopher on the other. Davy was a man of sanguine, enthusiastic temperament, overflowing with life and animation; Wollaston's nature was as still and unmoved as the bosom of a lake hidden from the wind in the recesses of a cavern. The former was a spoiled child of nature and of fortune, and greedy of applause. He delighted in the approving smiles of ladies, and was flattered by the notice of the great. It was a source of pain to him that he was not of good family. Wollaston was a disappointed man. He begged one boon from his brethren, the physicianship of an hospital; when that was refused him, he shut himself up in his laboratory, and rejoiced, when sixty years old, that he would not ask a favor, even for a brother. He was indifferent to the notice of all but scientific persons, and avoided every occasion of attracting popular attention.

To these attempts to bring out Wollaston's character by contrasts with that of his great contemporary, we would add a word or two concerning his likeness in disposition to another of our distinguished men of science. Those who are acquainted with the life of the Honorable Henry Cavendish will acknowledge that he and Wollaston resembled each other greatly. In both there was the same austerity, taciturnity and reserve; the same extreme caution in drawing conclusions, and exact precision in stating them; the same catholicity of tastes as regarded their philosophical pursuits; the same relish for scientific society and dislike to any other; the same indifference to applause; the same frugal habits; the same candor and justice towards other men of science; and the same strong love of truth and perfect integrity. And as in life they were alike, so in death they were not divided. The closing moments of the one, were marked by the same kind of calm courage and serenity which distinguished the death-bed of the other. Cavendish and Wollaston might in truth have been twin brothers.

The restraint and distraction of faculty which these three influences occasioned, were fatal to Wollaston's being a distinguished or systematic discoverer. His inordinate intellectual caution kept him from giving to the world any great generalization. Had he attempted one, he would have spent a lifetime in establishing it to his own satisfaction. His acquaintance with most of the physical sciences induced him, instead of dedicating his life to the establishment of some one great theory in a single branch of knowledge, to pursue many inquiries in each; these were sufficiently limited in scope to be brought to a conclusion, satisfactory even to his fastidious, sceptical spirit, in a reasonable time. His mechanical ingenuity constantly tempted him to improve some one of the thousand instruments of physical science which are not perfect.

He must nevertheless be counted great, on the ground of the multitude of single works which he executed so ably. He will stand in the second rank of great physical philosophers, along with Black and Cavendish, Davy and Dalton.