SMITHSON TENNANT, 1761-1815

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SMITHSON TENNANT was born at Selby, Yorkshire, on November 30, 1761, and christened in the Abbey Church there on December 3. His father, the Rev. Calvert Tennant, was the younger son of Edward Tennant of Mount Parke Farm, Wensley, and a Fellow of St. John's College, Cambridge. His mother was Mary, the only surviving daughter of William Daunt, apothecary of Selby. The Rev. Calvert Tennant's sister, Alice, married George Dinsdale of Nappa Hall, Wensleydale, and her daughter Alice married Christopher Pryme of Hull. The son of this marriage was George Pryme (1781-1868), who held the professorship of political economy at Cambridge, while Tennant was the professor of chemistry there (1813-15).

Tennant lost his father when he was ten years old, and his mother, by a fall from her horse while they were out riding in 1781, when he was twenty. During the intervening period, he attended the grammar schools of Scorton, Tadcaster and Beverley, in all of which he was fortunate to come under the influence of progressive and enlightened headmasters. It was during this period that the foundations of his later life as a natural philosopher were laid, for in addition to a good grounding in the classics, mathematics and French, the early interest in science which resulted from studying his grandfather Daunt's books was further encouraged by attendance in Tadcaster at the lecture of a Mr. Walker, an itinerant lecturer on popular science, and by the full use which he made of the excellent library at Beverley Grammar School, in which he found and eagerly studied a copy of Newton's *Treatise on Optics*.

His mother encouraged his growing love for science, and in 1781 plans were made for him to live as a pupil with Joseph Priestley. These, however, fell through and instead, just after his mother's fatal accident, Tennant entered the University of Edinburgh ostensibly as a medical student, but in reality so that he could study chemistry under Black. His notebooks of Black's lectures on chemistry, those of Munro Secundus on anatomy and surgery, and of Walker on natural history are still in existence. At Edinburgh, Tennant came into intimate relationship not only with Black but also with Hutton the geologist, Playfair the mathematician and Webb Seymour and his friends, the Horners, and it may be that Tennant performed experiments under the direction of Black and Hutton designed to support the latter's theory of rock formation. Tennant's stay in Edinburgh and especially his close association with Black profoundly influenced his attitude to science, confirming him in his choice of chemistry as the sphere of his life's work and leading him to accompany Black about 1790 as among the very first British scientists to accept in full the implications of the antiphlogistic theory.

Tennant left Edinburgh in 1781 and entered the University of Cambridge, again as a medical student, first as a pensioner at Christ's College and then, in 1782, as a Fellow Commoner of Emmanuel College. In an age when Fellow Commoners were noted more for their profligacy than for studious habits, Tennant's dedication to the pursuit of scientific inquiry is out-

standing, especially as he was now in complete control of his own fortunes. Tennant's close friends at Cambridge included Sir Busick Harwood, who occupied the chair of anatomy during 1785-1814 and was Downing professor of medicine during 1800-14; Isaac Milner, who became the first Jacksonian professor in 1793 and to whom Tennant lent his notes of Black's lectures on chemistry, Dr. Edward Waring, the Lucasian professor of mathematics, Whitehall Whitehall Davies, a close family friend of his boyhood; Thomas Smith, later of Easton Grey and friend of Ricardo and Malthus and John Whishaw, later the "Pope of Holland House", confidant of the most influential of Whig politicians and Tennant's lifelong correspondent. Both Milner and Waring sponsored his election to the fellowship of the Royal Society in 1785 when he was twenty-four, and all of them remained his close friends throughout his life. In 1788, he "kept his Acts" for the degree of M.B., and a historian of the period who knew him in College remarks that this Act and that for his M.D. in 1796 were "of the highest order though marked by great eccentricity".

In addition to his preoccupation with items of chemical research, Tennant, while at Cambridge, began his foreign travels. In 1784 he visited Denmark and Sweden with the object of becoming personally acquainted with Scheele, Gahn and Berzelius. The visit stimulated his interest in geology and mineralogy, especially as he learnt from Gahn the use of the blowpipe in mineral analysis and soon became an acknowledged expert. In 1786 he paid a visit to France, Holland and the Lowlands, where he met Berthollet, Delametherie and very probably Lavoisier. This tour enlarged and deepened his interest in political economy, a subject which fascinated him for the rest of his life. A further European tour in 1793 took him to Switzerland, where he met Gibbon, then living out his last years at Lausanne. Returning via Italy, Germany and France, he remarked that most of the German chemists he had met appeared still to be preoccupied with the search for the 'philosopher's stone'. About this time, Tennant was asked to stand as a candidate for the Jacksonian professorship at Cambridge, but withdrew his name later. F. J. H. Wollaston was eventually elected.

Shortly after taking his degree in 1788, Tennant left Cambridge to reside in London at 4, Garden Court, Temple, and began to engage in chemical research, to attend meetings of learned societies and to build up a wider and wider circle of friends and acquaintances among the scientists, political economists and political reformers of the day. He never practised medicine, although he seems to have been very much attracted to the works and opinions of Sydenham and the chemical aspects of disease. His personal fortune, his love of independence and hatred of restraint, his sensitive nature and benevolent personality stifled in him any desire to undertake the drudgery of the life of a practising physician, and added to this there was the growing success attending his private researches. Between 1791 and 1797 he read papers before the Royal Society

on the decomposition of fixed air, the nature of diamond and the action of nitre on gold and platina, all showing his growing mastery of research methods and in concept and design and showing, too, the strong influences of Black and the Edinburgh school of chemistry, the new ideas of chemical philosophy originating in the French school under Lavoisier and bearing, within the results, the seeds of greater triumphs in the future.

At this period of his life, Tennant's situation was indeed an enviable one. Rich enough to follow his own inclinations, he was at peace with himself because of his decision to devote himself to chemical research, was well established in London as a scientist of repute, and by the charm and benevolence of his personality was the centre of a widening circle of intellectual and influential friends. John Whishaw had come to live near him and through his friendship Tennant moved among the members of the Whig party at Holland House, while Francis Horner lived very near him in the Temple. The only ill-fortune was a gradual decline in his health, and even this turned out for the best, for, on being urged to cultivate more interests, he took up horse riding, in which he had not indulged since his mother's tragic death. This new form of exercise, which he continued to practise for the rest of his life, not only restored his health, but also started him off on a new venture. He became so interested in farming that, after experimenting for a year or two with a few acres of land near Epworth in Lincolnshire, he purchased 500 acres of land newly allocated under the Enclosure Act at Shipham in Somerset. On this land, Tennant built a small country house in which he lived every summer and entertained his friends. His interest in farming was not in growing crops, but in conducting agricultural experiments, and his experiences led to the publication of his paper on the different sorts of lime used in agriculture with special reference to the deleterious effect on crops of magnesium limestone.

So, from about 1800 onwards, Tennant's life moved within two circles, each with its own friends and acquaintances but at times overlapping; one predominantly scientific and the other centred around politics and political economy. The latter included Thomas Smith, and his home at Easton Grey in Wiltshire, which was within easy travelling distance of Tennant's country house. He was a constant visitor at Easton Grey, where he was held in the greatest personal esteem and where he became friendly with Ricardo and Malthus. The political circle also included Whishaw, Warburton, Sharp, Rogers, Dumont, Sir Samuel Romilly, Sir J. Mackintosh, Lord Brougham and Francis Horner, and others who moved among the Whigs of Holland House and belonged to a select dining club called the 'King of Clubs'. Here the talk was of reform and theories of political economy, and Tennant's interest was so aroused that he offered to found a chair of political economy at Cambridge and contemplated writing a treatise which would embody his views on the subject with reference both to Britain and to other European countries.

This increasing preoccupation with political economy and reform did not, however, affect in any way his scientific activities. His paper on the composition of emery published in 1802 gives evidence of his continuing experimental work, but a more important feature of his scientific life is the deepening of his friendship with W. H. Wollaston, which blossomed into active collaboration and partnership during the

next ten years. The friendship between the two men began at Cambridge, where Wollaston was a Pensioner and Scholar at Gonville and Caius College from 1782, graduating M.B. in 1787. He, too, attended Milner's lectures on chemistry and was taught the use of the blowpipe in mineral analysis by Tennant himself. During 1787-97 Wollaston was practising medicine in Huntingdon and Bury St. Edmunds, but when he went to London permanently in 1797, in order to pursue the calling of physician, the friendship was renewed and became intimate enough for Wollaston to act as Tennant's assistant during his experiments on the analysis of the diamond in 1797. It may be that this fruitful collaboration was a real factor, as well as the well-known incident at St. George's Hospital, in influencing Wollaston in his decision to give up a career in medicine for one devoted to chemical research. Indeed, there is evidence that Tennant's influence on Wollaston at this period of his life was very profound, for Warburton wrote in his biography of Wollaston that "Wollaston held Tennant's knowledge of the sciences in profound admiration and a few years after this time expressed his despair of ever becoming Tennant's equal as a Chemist".

From at least 1800 until his death in 1815, Tennant was both a financial and a scientific partner of Wollaston, a collaboration which brought fame to both men and success in many spheres of scientific achievement. The most spectacular result of the collaboration was achieved by the successful outcome of the series of experiments, initiated by a further study of Tennant's paper on the action of nitre on platina, which resulted in Tennant's discovery and extraction of osmium and iridium from crude platina, and Wollaston's discovery and extraction of palladium and rhodium. For this discovery Tennant was awarded the Copley Medal of the Royal Society, and Wollaston went on to develop his well-known method of producing malleable platinum and so pure platinum sheet. There is some evidence to suggest that this method may have owed something to Tennant's friendship with Black at Edinburgh. The practical result, however, was that the two men proceeded to make and sell the first platinum stills for use in the manufacture and purification of sulphuric acid. A further successful venture which lasted until 1811 was the manufacture of oxalic acid and oxalates, tartaric and citric acids from argol and lemon juice.

To this partnership, Tennant contributed money, a wealth of scientific acumen and knowledge and some practical skill, but it was Wollaston who contributed more and more of all three as time went on. Indeed, during the partnership, Tennant began increasingly to show something of that trait in his character on which all his friends have commented—the exhibition of a sense of a lack of purpose, a carelessness sometimes amounting almost to indolence which seemed to take possession of him and seemed to them to be akin to that shown by Dr. Black himself. The friendship, however, remained firm and close, because Tennant and Wollaston visited Ireland together in 1805. Tennant repeated the visit in 1806, but this time with W. G. Browne, the celebrated African traveller and explorer, another whose friendship Tennant valued highly until Browne's assassination near Tabriz in 1813. This friendship led to a similar one with the explorer Burkhardt, who died in 1809.

In addition to being a Fellow of the Royal Society and a member of the Royal Institution, Tennant was a founder member of the Askesian Society (1799),

renamed the Geological Society in 1806. In 1811, Tennant contributed a short note to the Society on native concrete boracic acid, and in 1813, when he was a vice-president, he delivered a lecture to the Society on the principles of mineralogy, in which he expressed his great indebtedness to the views expressed by Berzelius, who had stayed with him at his farm in 1812.

The success of this lecture, and those which Tennant was accustomed to give on chemistry and mineralogy to quite large gatherings of his friends in his rooms at Garden Court, together with his outstanding scientific achievements, convinced his friends of his suitability as a candidate for the professorship of chemistry at Cambridge, and in 1813 he was elected to the chair, following Farish, who had been elected to the Jacksonian professorship.

During the remaining two years of his life, Tennant divided his time between Cambridge, London and his farm at Shiphams. Letters in existence show a ripening friendship between Tennant and Berzelius after the latter's visit to England in 1812, and they throw light, too, on his friendship with the scientists Thomas Young, Marcet, Dr. McMichael and Sir James Sebright.

Tennant was involved in an interesting experience which may have had later important repercussions. An explosion occurred in a gas-holder belonging to the Gas Light Co. in 1813. In 1814, a committee from the Royal Society was charged with investigating the matter; and Tennant, who was a member of the Council of the Society, and another (Wollaston?), after a great deal of experimental work, showed that a flame will not pass through thin tubes and ignite an explosive mixture. Davy repeated these experiments in the following year and from the results discovered the use of gauze in the manufacture of the safety lamp. Dr. Marcet, writing to Berzelius in 1816, implies that Davy knew of Tennant's previous work but Davy always denied this.

Tennant's election as professor of chemistry at Cambridge gave great satisfaction to all concerned and had a stimulating effect on Tennant himself. Because of his scientific reputation and ability, and his personal qualities, it was confidently expected that he would establish and build up a notable school of chemistry in the University, and, but for his untimely death, there is every reason to think that this would have happened. His first course of lectures was attended by large audiences who were entertained and instructed by a masterly exposition of chemical principles illustrated by many experiments both of his own devising and also supplied by his many scientific friends. Among his first students were Charles Babbage and J. W. H. Herschel. During his short tenure of the professorship, Tennant revived an old interest in galvanism and built a much-improved voltaic battery embodying several unique features which he used with great success in his lectures. He also developed a new method of manufacturing potassium and published the results of his very first piece of experimental research on double distillation. It is now known that on the eve of his last Continental tour in 1814 he had completed two further pieces of research, one on the use of oxalic acid in the formation of sugar from starch and the other on the existence, extraction and purification of iodine from marine sources. He had also come to the conclusion that aragonite and calcite were dimorphic states of calcium carbonate, and he contemplated the publication of what would have been an important step in crystallography.

In September 1814 Tennant sailed for France, with Marcet and Wollaston, to enjoy a Continental holiday. After touring southern France, meeting Berthelot and Berard in Marseilles and staying with scientific friends in Paris, he reached Boulogne on his way home on February 22, 1815. Strong winds prevented a boat from leaving the harbour and Tennant, accompanied by Baron Bulow, went riding on the sands. While inspecting a small fort, a bridge over a deep ditch gave way under Tennant's horse, and as a result of this accident Tennant died in Boulogne hospital and was buried in Boulogne cemetery.

So far as is known, no likeness of Tennant exists, but it is said that in his features he closely resembled the philosopher Locke. He never married and seemed quite indifferent to female society. Of his influence on the scientific events of his day, there can be no doubt of its prime importance, not only because of his own personal contributions, but also because of his influence on the work of other scientists, notably Davy and Wollaston—an influence which does not seem to have been adequately recognized or appreciated. Of his character and personality, some words written by Brande and some by Dyer may be quoted. Brande wrote in his *Manual of Chemistry*: "Mr. Smithson Tennant was a profound philosopher and a matchless companion. His learning was without pedantry, and his wit without sarcasm. He was deep but always clear, gentle but never dull. To those who knew him not, it is scarcely possible to offer an adequate representation of his singularly pleasing and enlightened character by those who enjoyed his acquaintance and partook of his social hours. His extent of knowledge, his happy and unrivalled talent for conversation, his harmless but brilliant flashes of merriment and all his amiable peculiarities can never be forgotten". Dyer, who knew him at Cambridge, wrote: "It is pleasing to pay respect to a person whose modesty surpassed his industry, whose love of science was greater than his love of fame and to whom nothing perhaps was wanting to have rendered him one of the most distinguished men of his time except better health and more systematic habits of study".

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