Some account of the late Smithson Tennant, Esq., F.R.S., Professor of Chemistry in the University of Cambridge / [John Whishaw].

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SOME ACCOUNT

OF THE LATE

SMITHSON TENNANT, ESQ. F.R.S.

PROFESSOR OF CHEMISTRY

IN THE

UNIVERSITY OF CAMBRIDGE.

by J. Watson Esqre
author of the life of Park

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ADVERTISEMENT.

THE following circumstances, with which it is necessary that the Reader of these pages should be acquainted, will at once explain the occasion upon which the present narrative was composed, and furnish the best apology for its defects.—In consequence of an intimation that Dr. Thomson, the very respectable Editor of the *Annals of Philosophy*, intended to publish in that work a biographical notice respecting the late Mr. Tennant, it was thought right that a short memoir, to be inserted in that Journal, should be drawn up by some of Mr. Tennant's friends, who were best acquainted with the leading events of his life and with his principal studies and pursuits. The performance of this duty was delayed no longer than was necessary for procuring the information which appeared to be wanting relative to Mr. Tennant's early life; and the following narrative has lately appeared in two successive numbers of Dr. Thomson's Journal. A few copies of the work, with some slight additions, are now printed, for the purpose of distribution among Mr. Tennant's friends.

London, Aug. 1, 1815.

SOME ACCOUNT

OF THE LATE

SMITHSON TENNANT, ESQ.

F. R. S.

SMITHSON TENNANT, late Professor of Chemistry in the University of Cambridge, may be considered as one of those "who, without much labour, have attained a high reputation, and are mentioned with reverence rather for the possession than the exertion of uncommon abilities." * Of such a person it is perhaps impossible to give an account, which will satisfy the judgment of his friends, without being suspected by others of considerable exaggeration. Mr. Tennant is only known to the public by his papers in the Philosophical Transactions, which, however admirable as specimens of his scientific powers, afford a very inadequate idea of the real extent of his genius and knowledge. These were in many respects so extraordinary, that it would be taking a most imperfect view of his intellectual character to consider him only as a man of science. Some attempt therefore ought to be made to do justice to his other distinguished attainments; although a certain degree of caution is obviously requisite in speaking of those qualities, however remarkable, which cannot be truly appreciated except by his particular friends.

Mr. Tennant was the only child of the Rev. Calvert Ten nant, younger son of a respectable family in Wensley-dale, near Richmond, in Yorkshire, and Vicar of Selby in that county, where Mr. Tennant was born on the 30th of Nov. 1761. His mother, whose maiden name was Mary Daunt, was the daughter of a surgeon of the same town.

* Dr. Johnson's Life of Edmund Smith.

Of his father little is known, except that he had been a Fellow of St. John's College, Cambridge, and was a friend of Dr. Rutherforth, Regius Professor of Divinity in that University. He was spoken of with the most affectionate gratitude by his son for the care which he had bestowed on his education. To this he appears to have devoted himself from his son's earliest infancy; having begun to instruct him in Greek when he was only five years of age.

He had the misfortune to lose his father when he was about nine years old; and some years afterwards, shortly before he attained the age of manhood, was deprived also of his mother by a very melancholy accident. She was thrown from her horse, whilst riding with her son, and killed on the spot.

Mr. Tennant's education subsequently to his father's death was irregular, and apparently somewhat neglected. He was sent successively to different schools in Yorkshire, at Scorton, Tadcaster, and Beverley. He is described by one who recollects him at the first of these places as being of a grave and pensive cast, with the appearance of being indolent and dispirited, and rarely joining in the amusements of the rest of the boys. Being an only child, and under little restraint when with his mother, he appears to have left home with singular reluctance, and to have had little enjoyment while at school. There is reason indeed to believe that he looked back upon this period with no agreeable recollections, since he very seldom alluded to the events of his early life; and it is in the recollection of one of his friends that, on reading Mr. Gibbon's Memoirs, he entirely concurred in the protest which the historian has entered against the "trite and lavish praise of the happiness of our boyish years."

His talents were not suspected, and, if they had been known, would scarcely perhaps have been understood, by those concerned with his education. He appears, indeed, to have been little indebted for the eminence which he afterwards obtained, to any of his various instructors, and may be considered in a great measure as *self-educated*. This is perhaps more or less true of every person of distinguished talents or vigorous understanding. That it was in a remarkable degree the case of Mr. Tennant, will be evident from the few anecdotes, which are now recollected, of his early life.

He gave many proofs, while very young, of a particular turn for chemistry and natural philosophy, both by reading all books of that description which fell accidentally in his way, and making various little experiments which the perusal of such books suggested. His first experiment (as he has himself related) was made at nine years of age, when he prepared a quantity of gunpowder for fire-works according to directions contained in the Encyclopedia, or some other scientific book to which he had access.

During the time he was at school at Tadcaster, he happened to be present at a public lecture given by Mr. Walker, formerly well known as a popular teacher of experimental philosophy. Although then very young, he put several pertinent questions to the lecturer respecting some of the experiments, and displayed so much intelligent curiosity as to attract the attention of the audience, and give great additional interest to the lecture. Mr. Walker, sensible of the effect which the boy's presence had produced, requested that he would continue to attend his lectures during the remainder of the course.

From Tadcaster Mr. Tennant was removed to Beverley, then rather a considerable school, under the care of Dr. George Croft, who afterwards obtained ecclesiastical preferment at Birmingham, and became known as a controversial writer. Mr. Tennant went somewhat late to Beverley, and did not readily enter into the studies or discipline of the place. But, although he was singular in his habits, and led rather a sequestered life for a school-boy, he was very far from being idle. There was fortunately a good library belonging to the school, containing a great collection of miscellaneous books, to which he devoted as much time as was in his power. His studies, even at that early period, were principally directed to works of natural philosophy; and Sir Isaac Newton's Treatise on Optics was one of the books which he read with the greatest eagerness.

About the time of quitting school he was very desirous of completing his education under Dr. Priestley, whose reputation, in consequence of his brilliant pneumatic discoveries, was then at its height. His mother seems to have been disposed to gratify him in this particular; but the design was found to be impracticable, in consequence of Dr. Priestley's other engagements.

With such tastes and habits, it cannot be supposed that Mr. Tennant, at the time of his leaving school, was a very regular or accurate classical scholar. Yet for every really useful purpose he possessed the full advantages of a classical education. He had a competent knowledge of Greek, and was well versed in the Latin language. What was still more important, he had acquired a strong feeling, and rational admiration, of the great works in those languages, which are justly regarded as the standards of true taste, and models of literary composition; and he continued during the whole of his life to be a diligent reader of the principal Latin Classics.

In the choice of a profession, his attention was naturally directed to the study of medicine, as being most nearly allied to his philosophical pursuits. He went accordingly, about the year 1781, with that view to Edinburgh, where he had the best opportunities of gratifying his favourite tastes; and he had the good fortune to meet with an instructor in the celebrated Dr. Black, well calculated to stimulate and direct his curiosity.

Of Dr. Black Mr. Tennant always spoke in the highest terms, both as a scientific teacher, and as one of the principal founders of the great improvements in modern chemistry; and the following anecdote will show that Dr. Black was not altogether insensible of the merits of his pupil.—Mr. Tennant being at breakfast with him one morning, the conversation turned upon the new doctrines concerning heat; and some experiment was made, in which the temperature of a liquid was to be tried by the thermometer. Mr. Tennant, immersing the instrument in the liquid, instead of waiting during a long interval, until the mercury became stationary, noted the point to which it immediately rose; and then heating it above the temperature of the liquid, noted the point to which it fell: upon which Dr. Black observed, "I see, young man, that you know how to make an experiment."

It is a subject of regret that no particulars are known of Mr. Tennant's companions, studies, or occupations, during the time he was at Edinburgh. His stay, indeed, at that University, was of no long continuance; for in October, 1782, he was admitted a Member of Christ's College, Cambridge, where he began from that time to reside. He was at first entered as a Pensioner;

but, disliking the ordinary discipline and routine of an academical life, he obtained an exemption from those restraints by becoming shortly afterwards a Fellow Commoner.

It was at this period that he began to be intimately connected with Sir Busick Harwood, the late Professor of Anatomy at Cambridge, then also a Fellow Commoner of the same College.—During a long residence in that University, Professor Harwood was familiarly known to a very extensive circle of acquaintance, by many of whom he was perhaps chiefly valued for his social and convivial qualities. He had other merits, however, which were of a much higher order; and at the time when he first became acquainted with Mr. Tennant, there were some circumstances connected with his history and situation, which gave a peculiar interest to his character.

Sir Busick Harwood had gone out early in life to the East Indies, where he had obtained a competent fortune as a surgeon; but being compelled by ill health to return to his native country, he lost, by the misconduct of an agent, nearly the whole of what he had acquired. With the most cheerful and manly firmness, he began again his career of life; and with that view had entered himself at Cambridge at a much more advanced age than usual, for the purpose of obtaining a medical degree. His misfortunes and the spirit with which he rose above them, added to his liberal and benevolent disposition, his practical skill in medicine, his knowledge of anatomy and physiology, and his interesting accounts of the remote countries in which he had lived, produced their natural effect upon an ingenuous and inquisitive mind; and although there was a great disparity in the ages of Mr. Tennant and Professor Harwood, and a considerable difference in their tastes and habits, a cordial and sincere friendship was soon formed between them.

A circumstance happened during Mr. Tennant's residence at Cambridge, which gave occasion to a marked display of that independent and benevolent turn of mind, which distinguished his character throughout life. A Russian Gentleman had been sent to the University by the Empress Catherine, to be instructed in mathematics, with a view to an academical appointment in some place of a military or naval education in Russia. The remittances necessary

for the payment of his expenses were at first regularly made; but subsequently, in consequence of some accident or omission, were discontinued. After waiting for some time, the College tutors, seeing no prospect of obtaining the money from the Russian Government, thought themselves justified in taking legal measures against the party himself. Mr. Tennant, struck with the helpless situation of this unfortunate foreigner, without friends or resources, remonstrated for some time against the harshness of their proceedings, but without effect; and the young man was arrested. Mr. T. immediately took the proper steps to procure his release, and advanced him the means of support till he was enabled to return to Russia, where he was afterwards appointed a Professor in the Imperial Academy at Cronstadt.

Having entered somewhat late at Cambridge, and being destined for the medical profession, Mr. Tennant did not pay any great attention to the regular course of academical reading, or devote much of his time to the study of mathematics. He acquired, however, a general knowledge of the elementary parts of that science, and made himself master of the most important propositions in Newton's Principia. But his attention at this period was principally directed to chemistry and botany; and it may be recorded as an instance of his early progress in the former science, that about the time of his residence at Cambridge he mentioned to some of his friends the substance of an experiment respecting heat, which he did not make public till more than twenty years afterwards. The experiment here alluded to consisted in a mode of effecting a double distillation by the same heat, in consequence of a diminished pressure of the air; which was communicated by him to the Royal Society in 1814, and forms the subject of his last paper published in the Philosophical Transactions.

The attention of the chemical world was at this time principally engaged by the great controversy respecting the antiphlogistic theory, which experienced much opposition in England. It may perhaps be worth mentioning that Mr. Tennant entirely satisfied himself as to the truth of this doctrine, when at Cambridge, at a

very early period, and long before it obtained a general reception in this country.

But while engaged in these scientific pursuits, he was at the same time a very general reader of all the most interesting works in polite literature, history, metaphysics, and especially in political economy, which was one of his favourite studies, and on which he had already made many just and original observations. Yet, although he was thus incessantly employed, there was a singular air of carelessness and indifference in his habits and mode of life; and his manners, appearance, and conversation, were the most remote from those of a professed student. His College rooms exhibited a strange disorderly appearance of books, papers, and implements of chemistry, piled up in heaps, or thrown in confusion together. He had no fixed hours or established habits of private study; but his time seemed to be at the disposal of his friends; and he was always ready either for books or philosophical experiments, or for the pleasures of literary society, as inclination or accident might determine. But the disadvantages arising from these irregular habits were much more than counterbalanced by extraordinary powers of memory and understanding; and especially by a faculty, for which he was remarkable, of reading with great rapidity, and of collecting from books, by a slight and cursory inspection, whatever was most interesting and valuable in their contents.

It was during Mr. Tennant's residence at Cambridge that his principal friendships were formed; and the recollection of those who best knew him, will dwell upon this happy period of his life with a fond and melancholy pleasure. His health was then vigorous, his spirits were constant and unwearied, and his talents for society perhaps yet more striking and brilliant than in his after years. He was distinguished, even at that early period, by an extent of information, and maturity of judgment, which might have seemed to be the results of a long life of study and reflection; and these extraordinary attainments derived an additional interest, and peculiar grace, from the simplicity of his manners, the playfulness of his wit, and the careless, fascinating beauties of his conversation!

The summer of 1784 was employed by Mr. Tennant in travel-

ling into Denmark and Sweden, partly to examine the great mines for which the latter country is remarkable, but principally for the purpose of visiting the celebrated Scheele, for whom he had conceived a high admiration. He was much gratified by what he saw of this very eminent person; and was particularly struck with the simplicity of the apparatus by which his great experiments had been performed. On his return to England he had great pleasure in shewing to his friends at Cambridge various mineralogical specimens with which Scheele had presented him, and in exhibiting to them several interesting experiments which he had learned from that philosopher.

His next journey to the Continent, a year or two after his Swedish expedition, was to Paris, where he became acquainted with some of the most considerable French chemists. During his stay in that city he was seized with a dangerous illness; in consequence of which Professor Harwood, with the kindest solicitude, went immediately to join him; but finding his friend nearly recovered, he accompanied him on a tour through Holland and the Netherlands, previously to their return to Cambridge.

The latter of these countries, at the time when it was visited by Mr. Tennant, was in a state of insurrection against the Emperor Joseph II., and exhibited the singular spectacle of a bigotted people resisting a philosophic tyrant, and contending for their ancient privileges and establishments with the zeal and ardour of an enlightened nation.—Holland, then free and prosperous, presented a scene still more interesting and congenial to Mr. Tennant's feelings. He saw in that extraordinary country a striking illustration of his own most favourite opinions. He was gratified by the triumph of intelligent and persevering industry over the greatest physical difficulties; and by the general diffusion of wealth and comfort, the natural effects of unrestrained commerce, and of civil and religious liberty.

Such were Mr. Tennant's voluntary pursuits and occupations whilst in the prime and vigour of life, possessed of a competent fortune, exempt from every species of controul, and left to the sole guidance of his own disposition and understanding. After his mother's death, which happened about the time when he went to Edinburgh, he had no near relations, and seems from that time

to have been entirely separated from his family connections. His college vacations (except when he was travelling) were passed with an intimate friend in North Wales.

On the 13th of January, 1785, he was elected, at a remarkably early age, a Fellow of the Royal Society. Among the signatures to his certificate of recommendation were those of the most distinguished members of that body, who were connected with the University of Cambridge; namely, Dr. Waring, Dr. Milner, Dr. John Jebb, Dr. Maskelyne, and the Bishop of Llandaff. With most of these Mr. T. was well acquainted; and with Dr. Milner, in particular, he lived on terms of some intimacy.

He had hitherto continued to reside at Christ's College from the time of his entering there in the year 1782; but Professor Harwood having for some reason determined to quit that Society, Mr. Tennant removed with him in December, 1786, to Emmanuel College, of which he continued ever afterwards to be a member. In the year 1788 he took his first medical degree as Bachelor of Physic, and soon afterwards quitted Cambridge, and came to reside in London.

In the year 1791 he communicated to the Royal Society his Analysis of the Carbonic Acid. M. Lavoisier had proved by decisive synthetic experiments that fixed air was a compound of oxygen and charcoal; but no one had yet resolved that gas into its simple elements. Mr. Tennant, observing that phosphate of lime was not decomposed, when heated with charcoal, inferred that the joint attractions of phosphorus for oxygen, and of phosphoric acid for lime, exceeded those of charcoal for oxygen, and of carbonic acid for lime; and consequently that phosphorus and heated marble, when made to act on each other, would be resolved into phosphate of lime and charcoal. The correctness of this reasoning was fully justified by the event; and the result of the experiment was, not merely the analysis of the carbonic acid, which was the immediate object of the investigation, but the discovery of a new compound, consisting of phosphorus and lime, possessed of several curious properties.

The ingenuity and elegance of this experiment established Mr. Tennant's reputation as a chemist; and there being at the close of

that year the prospect of a vacancy in the Jacksonian Professorship at Cambridge by the resignation of Dr. Milner, he was prevailed upon by his friends to become a candidate for that situation; but desisted from the pursuit on finding that he had no reasonable prospect of success.

In the year 1792 he again visited the Continent, with the intention of travelling through France to Italy, and arrived at Paris not long before the memorable 10th of August. He hardly recognized some of his old scientific friends, now become Members of the Legislative Assembly, and deeply implicated in the revolutionary politics of the times. From various circumstances, he anticipated some great and speedy convulsion, and was fortunate enough to quit Paris on the 9th of August, before the flame actually broke out.

In passing through Switzerland he visited Mr. Gibbon, at Lausanne, and was much struck with his powers of conversation, and the sagacity of his remarks on the course and progress of the French revolution, and on the probable issue of the invasion of France by the allied armies under the Duke of Brunswick.

In Italy he was delighted with the softness and beauty of the climate and the luxuriance of the vegetation, and was astonished by the wonders of ancient and modern art at Rome and Florence. He had hitherto been somewhat sceptical as to the degree of merit really belonging to the great masters in painting, whose fame he had supposed to be founded principally upon exaggeration. But he was converted from this error by the great works of Raphael and Correggio; and of the former, more especially, of these distinguished artists, he was ever afterwards a devoted and enthusiastic admirer.

He returned from Italy through a part of Germany, and was much amused with the mixture of science and credulity which he found in some of the German chemists. The philosopher's stone was spoken of with respect; and he received from a man of science and character an introduction to a person who was reputed to be in possession of that treasure. Mr. Tennant used to relate with his own peculiar humour the solemnity with which he was received by this person; with whom he conversed in Latin, and

who exhibited to him the mysterious powder, enlarging upon its transcendent qualities with much pomp, and in flowing and sonorous periods.

On his return through Paris in the latter end of 1792, or beginning of 1793, he was deeply impressed with the gloom and desolation arising from the system of terror then beginning to prevail in that capital; a particular instance of which deserves, on several accounts, to be recorded.

Among his philosophical acquaintance at Paris, there was one distinguished by his simplicity and moderation, of whose excellent qualities he always expressed a high value. This was M. Delametherie, editor of the *Journal de Physique*. Upon calling at his house, Mr. Tennant found the doors and windows closed, as if the owner was absent. Being at length admitted, he found his friend sitting in a back room, by candle-light and with shutters closed, in the middle of the day. On his departure, after a hurried and anxious conversation, his friend conjured him not to come again, as the knowledge of his being there might be attended with serious consequences to them both. It may be mentioned, to the honour of this Gentleman, that through all the inquisitions of the revolution he preserved for his friend property of considerable value, which Mr. Tennant had entrusted to his care.

Soon after Mr. Tennant's return from the Continent, he took chambers in the Temple, which continued from that time to be his established place of residence; and for many years his society was very much limited to a small circle of friends. Owing to accidental circumstances, his early connections had been much more formed among students of the law than among those of the profession which he had originally designed to pursue, but to which he was gradually becoming more and more indifferent. He had not, however, as yet abandoned the intention of practising medicine; and for several years applied himself to the cultivation of the studies connected with that science, and attended regularly at some of the principal London hospitals. Of his industry and perseverance in this course sufficient proofs exist in the medical notes and memoranda now found among his papers; and it is well known to some of his

friends that he had also read with great attention most of the standard books in that science. Among these he always spoke of the works of Sydenham (with reference to the age in which they were produced) in terms of the highest admiration. Curiosity had also led him to examine the principal medical writers of antiquity, whose merits and defects he correctly appreciated, and upon whom he had made many curious and valuable remarks. He had taken a comprehensive view of the origin and progress of medicine, and of the various medical theories and opinions which have prevailed in different ages and countries; and seemed on this account peculiarly well qualified (independently of his practical knowledge) to have written a philosophical history of the science.

But the question was very different, how far he was well qualified to practise medicine with advantage as a lucrative profession; and the period was now arrived, when this point was to be determined. Several of his friends, although very doubtful as to the ultimate success of the measure which they recommended, were yet extremely desirous that he should try the effects of a regular profession; which they considered as affording the best prospect of giving an useful direction to his talents, and fixing his desultory habits. In deference chiefly to their opinion, he took his degree of Doctor of Physic at Cambridge in the year 1796, and for some time had serious thoughts of commencing medical practice. But, after some hesitation, he wisely relinquished a design, which, whether successful or not, was unlikely to contribute to his happiness. His desires were moderate, and his private fortune exempted him from the necessity of following any employment as the means of subsistence. He was at liberty, therefore, to indulge his own inclinations; and his careless, independent habits of life, no less than the general cast of his character and understanding, rendered him altogether averse to the drudgery and restraints of a profession. It may be observed also as a circumstance by which he was undoubtedly much influenced in adopting this resolution, that he had suffered very greatly, during his attendance at the hospitals, in consequence of the acute and painful emotions he had constantly experienced from those sights of hopeless misery which he had so often

occasion to witness. He justly apprehended that the frequent recurrence of such scenes, unavoidable in medical practice, would be destructive of his comfort and happiness.

The keen and exquisite sensibility, from which these feelings originated, was a striking feature in Mr. Tennant's character, and not only gave a colour to many of his opinions, but powerfully influenced his conduct. An instance of his practical benevolence, derived from this principle, happened about this period, which may perhaps deserve to be mentioned. He had a steward in the country in whom he had long placed implicit confidence, and who was considerably indebted to him. In consequence of this person's becoming embarrassed in his circumstances, Mr. Tennant went into the country, in order to look into his accounts. A time and place were appointed for him to produce his books, and shew the extent of the deficiency; but the unfortunate steward felt himself unequal to the task of such an explanation, and in a fit of despair put an end to his own existence. Touched by his melancholy fate, Mr. Tennant used his utmost exertions for the relief and protection of the family whom he had left, and not only forgave them the debt, but afforded them pecuniary assistance, and continued ever afterwards to be their adviser, friend, and benefactor.

During the course of the year 1796 Mr. Tennant communicated to the Royal Society his paper on the nature of the Diamond. Sir Isaac Newton had conjectured that this body was inflammable, as was afterwards proved by the experiments of the Duke of Tuscany and of Messrs. Darcet and Rouelle. M. Lavoisier effected its combustion by means of a lens, in close vessels, and obtained from it a gas, which precipitated chalk from lime-water. But this was at an early period of pneumatic chemistry; and although he concluded that the gas was fixed air, yet he did not consider the analogy between charcoal and the diamond as very intimate, but as depending only on their common property of being combustible. The merit of completely ascertaining the nature of this substance was therefore reserved for Mr. Tennant. He succeeded in burning the diamond when reduced to powder, by heating it with nitre in a gold tube. A solution of the alkaline salt was then poured into

liquid muriate of lime; and the quantity of carbonic acid which had been generated, was inferred from the weight of the precipitate, which was found to consist of carbonate of lime.

From experiments made upon minute quantities of diamond powder, not exceeding $2\frac{1}{2}$ grains, he shewed, by comparing them with Lavoisier's experiments on charcoal, that equal weights of diamond and charcoal yield equal quantities of fixed air, and that fixed air contains between 27 and 27·8 per cent. of diamond; results which very nearly agreed with those of M. Lavoisier, and were subsequently confirmed by the investigations of Messrs. Allen and Pepys.

In the course of his investigation of the diamond, Mr. Tennant observed that gold and platina were corroded and dissolved by heated nitre; and that on the addition of water to the salt, the metals, owing to the presence of nitrite of potash, were in a great measure precipitated. These appearances, together with some peculiar properties of the nitrous solutions of gold, were the subject of a further communication to the Royal Society in 1797.

It is worthy of remark, that Mr. Tennant had ascertained the true nature of the diamond some years before he made the above communication to the Royal Society. In conversing about this time with a particular friend, whom he was attending with affectionate care during a lingering illness in the spring of 1796, he happened to mention the fact of this discovery. His friend, who had often lamented Mr. T.'s habits of procrastination, urged him to lose no time in making his experiment public; and it was in consequence of these entreaties that the paper on the diamond was produced. A still more remarkable example of the same indolence or inattention occurred in the case before alluded to of the paper on double distillation, communicated to the Royal Society in 1814, the substance of which he had mentioned to some of his friends during his residence at Cambridge.

These facts are memorable and instructive instances of the strength and weakness of Mr. Tennant's mind. His curiosity and activity were incessant; he had a vigilance of observation which suffered nothing to escape him, and was continually gaining new

information from a variety of interesting sources. But although the knowledge thus acquired was remarkable for its correctness, and complete for the purposes of its possessor; yet the industry and perseverance, by which it ought to have been embodied and made permanent for the benefit of others, were too often altogether wanting. The ardour and energy of Mr. Tennant's mind co-operated, unfortunately in this respect, with his want of method and systematic habits of application; since he was continually pressing on to new discoveries, instead of arranging and bringing to perfection those which he had already made.—His memory was a great storehouse of discoveries and hints for discovery, of ascertained facts, probable conjectures, and ingenious trains of reasoning relative to the various important subjects, upon which he had at any time been engaged. These he was continually treasuring up, with the intention of reducing them to order and preparing them for use at a more convenient season. But that period rarely arrived. In the carelessness of intellectual wealth, he neglected the funds of information which he had accumulated, and suffered them to remain useless and unproductive, till his attention was recalled to them, perhaps after a long course of years, by some new fact or discovery, some remark in conversation, or other accidental occurrence.—It is yet to be ascertained, by a careful examination of his papers, whether any fragments of this great body of knowledge still remain, which can now be converted to use; and whether any of his various discoveries not hitherto made public (some of which unquestionably were important) are capable of being traced out and understood from the loose and imperfect hints which his scattered notes may furnish. But there is too much reason to believe that the far greater part of them existed only in the mind of their author, and that with him they have unfortunately perished!

That desire of visiting remote countries, of viewing the productions of Nature in more favoured climates, and of observing the practical effects of different systems of laws and government, which is common to every man of talents and curiosity, was felt with

peculiar force by Mr. Tennant, and may be considered as one of his ruling passions. He was therefore much disposed, after he had relinquished the intention of medical practice, to indulge this inclination, and to travel in those parts of Europe which he had not already visited. But the war with France opposed many obstacles to a continental excursion; and the uncommon sufferings which he experienced from sea sickness, deterred him from forming any project in which a sea voyage of any considerable length was to be undertaken. He often regretted that this unfortunate peculiarity of his constitution prevented him from seeing the United States of America; and he abandoned, but with considerable reluctance, those schemes of travelling in distant countries, to which, at this particular period of his life, he would otherwise have been strongly inclined.

But although he was thus prevented from indulging in a favourite taste, his situation at this period was in many respects one of the most enviable, in which a man of science could be placed. He was independent in his circumstances, and being free from all professional avocations, enjoyed the entire command of his own time. His residence in the metropolis gave him easy access to whatever was new and valuable in science and literature, as well as the means of constant intercourse with several of his most intimate friends, who were more or less interested in his own particular pursuits, and with whom he could freely communicate relative to the various subjects upon which he was continually employed. His philosophical reputation was established, his talents were fully acknowledged, and he was beginning to be known and valued in a distinguished circle of society for the extent and originality of his knowledge, and his extraordinary powers of entertainment and information.

Something, however, was still wanting to his happiness; for though his time was agreeably and usefully filled up, he was without any regular occupation or definite object of pursuit; and his studies, however interesting, were too desultory to fix his attention, or take a sufficiently permanent hold on his thoughts. The composition of some literary or scientific work (of which at different

periods of his life he had several vague and floating projects*) would have been the natural resource and occupation of such a mind. But although Mr. Tennant was capable of great efforts on a sudden emergency or for a particular purpose, he had his full share of that indecision, and fastidiousness of taste, which belong to the temperament of genius; and which seldom fail, unless counteracted by early habits of self controul, to disqualify the possessor for those long continued, and persevering exertions, so indispensable to great literary undertakings. This defect of resolution, originating in part from his extraordinary powers, was lamented by all his particular friends, but by no one more feelingly than by Mr. Tennant himself. It increased with his increasing years; and the evil was now aggravated by an unfortunate alteration in the state of his health, which was beginning gradually to decline, and to require continual attention.

It was owing principally to these causes that, within a very few years after he had relinquished the study of medicine, he became insensibly disposed to some new occupation; and one of those accidents upon which the fortunes of human life depend, determined him to engage in agricultural pursuits. He had for some time been accustomed to take long journeys for the sake of his health; during one of which he happened to pay a visit to a friend at Epworth, in Lincolnshire, who had been much connected with his family, but with whom he was not in habits of regular intercourse. This was about the year 1797, at an early period of those great advances in agriculture, since become very general, by which that part of the kingdom has been so much distinguished. His friend's residence was in an extensive

* The following are among the subjects, upon which Mr. Tennant expressed to different friends the intention, or rather the wish, of writing. They may serve, in some degree, to mark the character of his mind.

A treatise on Political Economy. This was his favourite literary project, and at one period of his life engaged a great deal of his attention.

Biographical memoirs of some of those distinguished persons, to whose literary or scientific merits justice has not been done (owing to accidental causes) by their contemporaries or by posterity. Among these he particularly mentioned Dr. Priestley.

Observations on the principles of the French Revolution, and the causes of its failure.

tract of country, very favourable for such improvements, adjoining to the river Trent, and known by the name of the Isle of Axholme, where very considerable inclosures had lately taken place. A great spirit of enterprize had, in consequence, been excited; and the cultivation of new land (principally by the growth of rape seed) was carried on to a great extent, and with extraordinary vigour and effect. There was nothing in the previous habits of Mr. Tennant's life which had particularly led him to the study or practice of agriculture; but the sight of these great improvements afforded much gratification to his feelings, and was highly interesting to his curiosity. His attention was very naturally directed to the system of cultivation itself; and the knowledge and experience of his Lincolnshire friend, who had himself practised the new husbandry with great intelligence and success, afforded him the best means of information relative to the whole of this subject. Under the influence of his example and advice, and after having satisfied himself that the speculation afforded a reasonable prospect of advantage, Mr. Tennant shortly afterwards purchased several allotments of uninclosed land in that neighbourhood, and began to cultivate them on his own account, entrusting the chief management of the concern to the skill and judgment of his friend. At subsequent periods he purchased other allotments, and made considerable additions to this property.

From the time of making his first purchase in Lincolnshire, Mr. Tennant paid great attention to the study of rural economy; and his attachment to this new pursuit gradually increasing, he became desirous of engaging in some agricultural concern upon a more extensive scale. It was with this intention that about the year 1798 or 1799 he purchased a considerable tract of waste land, newly allotted under an Inclosure Act, on the Mendip hills in Somersetshire. The purchase was originally made in conjunction with a particular friend, who for some time resided on the spot, and personally superintended the concern. But a partition of the estate afterwards taking place, a portion of land was assigned to Mr. Tennant, situated near the well-known village of Cheddar, which was retained by him in his own hands, and became the principal scene of

his farming operations. Here he built a small house, at which, during the remainder of his life, he passed some months every summer, besides occasional visits at other times of the year.

London, however, still continued to be the principal place of his residence; since his passion for agriculture, however strong, had in no respect diminished his high relish for the pleasures of cultivated society, and for the interesting objects continually afforded by the metropolis. It must be obvious, however, that these latter tastes must have interfered very considerably with the due management of his farming concerns. Such undertakings, in order to be profitable, require for the most part strict personal inspection and an incessant attention to minute details. This sort of vigilance it was impossible for Mr. Tennant to exert; but he kept up a constant correspondence with his agents in the country, receiving from them such information, and transmitting such instructions, as could be communicated by letters. For a certain period (as it was reasonable to expect) owing partly to his own inexperience, and partly to unfavourable seasons and other accidents, his speculations were not prosperous; and he occasionally suffered some anxiety and disappointment. But in process of time he acquired more practice and information, and became insensibly habituated to many trifling vexations, which at first had given him uneasiness. The prospect gradually brightened; and during the latter part of his life his concerns were brought into better order, and appear to have been attended with a reasonable degree of success.

But whether these agricultural undertakings were profitable or not, they doubtless contributed in several important respects to his comfort and happiness. They were conducive to his health, by affording additional motives for exercise in the open air, and for those long journeys on horseback which his constitution required, and which were thus rendered less irksome. They furnished his mind with a perpetual supply of that steady, equable occupation, which forms so essential an ingredient in human happiness, but which possibly he would not have provided for himself from any other source. What was scarcely less important, these pursuits were the accidental occasion of his reviving a connection with one

of his early friends,* formed originally at Cambridge, but which distance of place and other circumstances had interrupted for many years. The intercourse between them was renewed soon after Mr. Tennant became established at the Somersetshire farm, which was not very distant from his friend's residence; and it was productive of great happiness to both parties. Mr. Tennant found in his friend's family those congenial tastes and opinions, which form the strongest bond of union; and during the remainder of his life he invariably experienced from them all that affectionate regard, which the greatest personal esteem, united with a sincere admiration of his talents, could inspire. With these friends, whenever he had leisure and inclination, he found a constant home; and it is highly probable that some of his happiest hours were passed in their hospitable mansion.

The change in his habits, occasioned by his agricultural engagements, was not equally favourable to his scientific pursuits. His spirits were often exhausted, and his mind fatigued and oppressed, by the attention which he thought it necessary to bestow upon the correspondence with his agents, the examination of his farming accounts, and other details equally tedious and minute; and it is impossible to reflect upon the time thus consumed, without lamenting that it was not employed for purposes more beneficial to mankind, and more worthy of his genius and understanding.

It appears, however, from various notes and memoranda, which are found among his papers, that from the time when he first became engaged in agricultural pursuits, he was very industrious in procuring information from the best works upon farming, and that he made various practical remarks during his journeys, and collected many accurate and circumstantial details relative to the modes of cultivation adopted in different parts of England. In the course of these inquiries, he had discovered that there were two kinds of lime-stone known in the midland counties of England, one of which differed from common lime-stone in yielding a lime injurious to vegetation. He explained the cause of this difference in a paper

* Thomas Smith, Esq. of Easton Grey, Wiltshire.

communicated to the Royal Society in the year 1799; shewing that carbonate of magnesia is an ingredient in the latter species of lime-stone, which he describes as forming an extensive stratum in the mid-land counties, and as being found also in many other situations, particularly among the primitive marbles, under the name of Dolomite. He gives the proportions in which lime and magnesia exist in many specimens of this lime-stone, and infers from its slow solution in acids, and from its crystalline structure, that it is rather the result of chemical combination than of a casual mixture of the two earths. This conjecture has since been verified by the goniometrical researches of Dr. Wollaston, and by the near agreement of Mr. Tennant's analysis with the constitution of the mineral as inferred from the law of definite proportions.

Mr. Tennant had found that grain will scarcely germinate, and soon perishes, in moistened and perfectly mild carbonate of magnesia; and that the injurious effects of the magnesia in agriculture do not depend on its property of long remaining caustic, but probably on some inherent quality of the earth itself. He also made many experiments on the germination and growth of various seeds and plants in different mixtures of the simple earths; and transporting portions of soil, either from his own estates, or from different parts of England, to the neighbourhood of London, he tried on a small scale the effects of various manures in promoting the growth of different vegetables, and endeavoured in this way to obtain hints for improved modes of cultivation.

In the year 1802 he communicated to the Royal Society his chemical examination of Emery, which had hitherto been considered as an ore of iron. He shewed that it consists principally of alumina, and that it nearly agrees with the Corundum of China, which had been analyzed a short time before by Klaproth.

In the month of July during the same year, in endeavouring to make an alloy of lead with the powder which remains after treating crude platina with aqua regia, he observed remarkable properties in the powder, and found that it contained a new metal. But while he was engaged in pursuing this investigation, the attention of two French chemists was accidentally directed to the same object. In the autumn of 1803 M. Descotils had discovered that the powder

contains a metal which gives a red colour to the ammoniacal precipitate of platina; and M. Vauquelin having treated the powder with alkali, obtained from it a volatile oxide, which he considered as belonging to the same metal.

In the spring of the year 1804, Mr. Tennant having completed the course of his experiments, communicated the results to the Royal Society. He shewed that the powder consisted of two new metals, to which he gave the names of Iridium and Osmium; and that these might be separated from one another by the alternate action of heated alkali and of acid menstrua. By crystallization from the acid solution, he obtained a pure salt of iridium, from which he determined with accuracy the real properties of the metal and of its compounds; and from a comparison with these he ascertained that the volatile oxide belonged to another metal (osmium), which he also obtained in a state of purity.

The analysis of crude platina presented, perhaps, some of the greatest difficulties, with which chemistry had ever yet ventured to contend. Besides affording traces of several of the known metals, the ore contained, in very minute quantities, *four* new metallic elementary bodies, whose existence were previously unsuspected, and whose respective characters were to be distinguished, before the separate nature of the bodies could be ascertained. Dr. Wollaston and Mr. Tennant, who were employed upon this ore at the same time, and whose habits of friendly intercourse led them to communicate freely with each other during the progress of their experiments, gave proofs of their great sagacity by completely solving this problem; Mr. Tennant in the manner already described, and his friend by the discovery of the two metals, Palladium and Rhodium.

On the 30th of November, 1804, Mr. Tennant had the honour of receiving the Copley medal, which was conferred on him by the Royal Society for his various Chemical Discoveries.

About the year 1805 and 1806 Mr. Tennant made two journeys during successive summers into Ireland; going and returning on both occasions by Scotland, in order to abridge as much as possible

the sufferings attendant on a sea voyage. In the course of these journeys he visited most parts of Ireland which possess any attraction for a traveller, and had the advantage of viewing the Giant's Causeway, in company with Dr. Wollaston, whom he met by a fortunate accident in the north of Ireland during one of these tours.

His attention, however, was not confined to scientific objects; for he made many remarks on the agriculture, manufactures, and general state of Ireland. He was particularly struck with the vast population of the country, compared with that of Scotland, through which he had lately passed, and even with the average population of England. The backward state of its improvement and cultivation, considering its various resources, and the natural fertility of the soil, presented other objects of contrast, which could not fail to interest him. His attention was naturally led to the causes of this inferiority; but to enter into his opinions on this important subject, would require a wider field of discussion than is consistent with the limits of the present narrative. One observation, however, selected from many others, which is strongly marked with his characteristic liberality and good sense, may perhaps deserve to be mentioned. His curiosity had led him to inquire into the state of education among the lower Irish Catholics, and he was much struck with the narrow and illiberal cast of most of their books of popular instruction. This, which he justly considered as a serious evil, he attributed in a great degree to a sort of party spirit in the Catholic clergy, occasioned by the unfortunate alienation subsisting between them and the Government. He observed, that if proper means were taken to conciliate this important body, they would gradually relax from their strictness, and become better informed and more enlightened; and that thus, without the formality of conversion, the great mass of their followers might perhaps, by little and little, imbibe a portion of the spirit of protestantism, and be brought to partake of the knowledge and improvements of the age.

In one of the journeys to Ireland, which has given occasion to these remarks, Mr. Tennant was accompanied by Mr. Browne, the celebrated African traveller, with whom he had lived for some time in habits of great intimacy. As Mr. Browne, although

not much personally known, was remarkable on several accounts, and a man of considerable merit, it may not be improper to describe shortly the nature and origin of this connection; which will also afford an opportunity of throwing a new light upon Mr. Tennant's character, and placing it in a particular point of view, in which it has not yet been considered.

Mr. Tennant was one of the most determined advocates of civilized life, in opposition to those sentimental theories, which extol simplicity, and undervalue the advantages of a refined and cultivated age. The decided superiority of the latter was one of his favourite topics of conversation; and he would often dwell with particular pleasure upon the spirit of improvement displayed in our own times, and the energy and intelligent activity of modern Europe, which he was fond of contrasting with the apathy and torpor of the East. Yet by one of those inconsistencies from which no human understanding is entirely exempt, he took a singular interest and delight in all accounts of Oriental nations, and in the minute circumstances and details of their characters, habits, and manners. His imagination was gratified and affected, in an extraordinary degree, by the historical recollections associated with those remote countries, the ancient seats of civilization and science; as well as by the remarkable contrast between their former and present state, and the still more striking peculiarities which now distinguish them from the polished nations of Europe. * The result of these feelings was a great partiality and fondness for the countries themselves; and a certain degree of respect for the fixed, immoveable institutions, the calm tempera-

* In writing to an intimate friend, Mr. Tennant thus expresses himself on this subject: "When I return from the country, I will inquire about the books you mention. I am glad you stick to the East. All the romantic associations are in its favour; ancient history and fables; difference of government, manners, and religion;" &c. &c.—Mr. Tennant had given so far into this Oriental taste, as to have formerly thought of undertaking a journey to Constantinople; and when the continent of Europe was open in 1814, he had a serious intention of travelling through Spain, for the sake of visiting some of the Moorish parts of Africa, by way of Gibraltar. If this journey had been practicable, and if his health had permitted him to accomplish it, the consequence might in one respect have been unfortunate. The *realities* which he would then have witnessed, would most probably have dissolved the spell which bound his imagination, and put a complete end to those agreeable illusions, in which he willingly, and to a certain degree rationally, indulged himself.

ment, and the dignified gravity and imposing exterior of the present inhabitants. He was therefore a considerable purchaser and collector of books and engravings relative to the East; and had perused with great eagerness and curiosity all the numerous publications respecting Turkey, Egypt and Persia, which have appeared during the last twenty years. He was also familiarly acquainted with the principal Eastern travellers of former times; among whom Chardin, Norden, Russell and Shaw, were those whom he particularly valued. His knowledge of the countries described by these writers was remarkably accurate and minute, and extended in many cases even to geographical details.

With the tastes and feelings resulting from this turn of mind, it may easily be conceived that Mr. Tennant had a peculiar gratification in the society of Mr. Browne. He found in that distinguished traveller, not only an intimate acquaintance with those countries which so much interested his curiosity, but a considerable fund of learning and information, united with great modesty and simplicity, and much kindness of disposition. By strangers, however, Mr. Browne's character was apt to be misunderstood. Whether from natural temperament, or from habits acquired in the East, he was unusually grave and silent, and his manners in general society were extremely cold and repulsive. Even in company with Mr. Tennant, to whom he became sincerely attached, he would often remain for some time gloomy and thoughtful. But after indulging himself for a few minutes with his pipe, his eye brightened, his countenance became animated, and he described in a lively and picturesque manner the interesting scenes in which he had been engaged, and to which he again looked forward. Of the impression left on Mr. Tennant's mind by these interviews, some idea may be formed from the following passage of a letter written by him to an intimate friend soon after he had received the account of Mr. Browne's death. "I recall," he says, "the *Noctes Arabicæ* which I have often passed with him at the Adelphi, where I used to go whenever I found myself gloomy or solitary; and so agreeable to me were these soothing, romantic evening conversations, that after ringing his bell, I used to wait with some anxiety, fearful that he might not be at home."

In the autumn of 1812, some years after his journey to Ireland

with Mr. Tennant, Mr. Browne took his departure from England on an expedition which he had long projected, to the unexplored Tartar city of Samarcand. He first visited Constantinople; and, at the instigation of Mr. Tennant, made a diligent, but fruitless, search for the meteoric stone, which is mentioned to have fallen at Egospotamos in the Parian Chronicle and the Natural History of Pliny. From Constantinople he went to Smyrna, where he passed the winter, and from thence to Tabriz in Persia; from both which places he wrote several very interesting letters to Mr. Tennant. In one of these he mentions, that in passing through Armenia he had satisfied himself by mineralogical observations, that a considerable tract of that country, including Mount Ararat, is of volcanic origin. He likewise ascertained, by measuring the temperature of boiling water, (at the suggestion of Mr. Tennant) that the city of Arzroum, the capital of Armenia, is 7000 feet above the level of the sea.

Most unfortunately for the cause of scientific discovery, Mr. Browne perished soon afterwards (as is well known) by the hands of Banditti, near the river Kizzil Ozan, east of Tabriz. Previously to his leaving England, when he was setting out on this journey, he had made his will, by which he named Mr. Tennant one of the executors, and left him a considerable bequest. On opening the packet in which the will was enclosed, a paper was found in Mr. Browne's hand-writing, containing a remarkable and characteristic passage from one of Pindar's Odes, highly expressive of that generous ambition, and contempt of danger and death, which are the true inspiring principles of such enterprizes.* Till he saw this

* The following is the passage alluded to:—

Ὁ μέγας δὲ κίνδυ-
νος ἄναλκιν ἐ φῶ-
τα λαμβάνει. Θανεῖν δ' οἵοισιν ἀνάγκα,
Τί κέ τις ἀνώνυμον γῆρας ἐν σκότῳ
Καθήμενος ἕψοι μάταν, ἀτάντων
Καλῶν ἄμμορος; ἀλλ' ἐμοὶ μὲν ὅτοσὶ
Ἆθλος γ' ὑποκείσεται.

Pindari Olymp. Carm. 1, v. 129.

In the paths of dangerous fame
Trembling cowards never tread;
Yet since all of mortal frame
Must be number'd with the dead,

paper, Mr. Tennant, notwithstanding his long intimacy, had never been fully aware of the real force of his friend's character, and of the powerful and deep feelings, which the habitual reserve and coldness of his manners had effectually concealed from observation. *

It was before stated that Mr. Tennant's health had been gradually declining. His frame was naturally feeble; and during the latter years of his life, though he was seldom materially indisposed, he was scarcely ever entirely well. Almost always on going to bed he had a certain degree of fever, and was often obliged to get up in the middle of the night, and to obtain relief by exposure to the cool air. To preserve himself in any degree of bodily vigour, he was under the necessity of using daily exercise for several hours on horseback; a practice which, though he complained of as a serious encroachment on his time, he hardly ever omitted in the severest weather. His long journeys into various parts of England and Ireland were usually performed in this manner.

In the summer of 1809, as he was riding to Brighthelmston, he met with a serious accident, by which his collar bone was broken. He was removed to the house of his friend Mr. Howard, in the neighbourhood of London, where he was treated with the most affectionate kindness, and remained till his complete recovery.

During the early period of his residence in London, Mr. Ten-

Who in dark inglorious shade
Would his useless life consume
And with deedless years decay'd
Sink unhonour'd to the tomb?
I that shameful lot disdain,
I this doubtful list will prove.—
West's Pindar.

* It may be worth mentioning, that Mr. Tennant always lamented, after he became acquainted with Mr. Browne's learning and talents, that his intimacy with him had not commenced before the publication of his African Travels. In preparing that work for the press, Mr. Browne, from an unreasonable distrust of his own powers, had thought it necessary to have recourse to literary assistance; but was by no means fortunate in his compiler. Neither the style of the Travels, nor the tone in which they are composed, is such as to do any justice to the important information which they contain, or to the character and merits of the distinguished traveller whose name they bear.

nant had led rather a retired life; but in his more advanced years he went much more into the world, and cultivated general society. He had a particular pleasure in conversing with intelligent travellers newly returned from distant countries, or in suggesting rational objects of inquiry to such as were about to visit them. As an instance of the latter, it may be mentioned, that he was at considerable pains in instructing M. Burchardt, a gentleman sent out by the African Association to explore the interior of that continent, in the principles of mineralogy. He frequently gave small morning parties at his chambers in the Temple, which he rendered very amusing to his friends by the exhibition of interesting prints and drawings, of rare specimens and new substances in chemistry, or of other objects calculated to gratify an intelligent and well-directed curiosity. It happened in the spring of 1812 that he had engaged to shew his mineralogical collection to a large party of his acquaintance, with a view of explaining to them the nature of some of the principal substances, and of giving them some general ideas of mineralogy. His intention being known, several others of his friends requested permission to be present; and he was gradually induced to extend his original plan, and give a few lectures on the general outlines of mineralogical chemistry. The undertaking was somewhat arduous, considering the expectations which his high character was likely to excite, his total inexperience as a lecturer, and the difficulty of adapting himself to so mixed an audience; which, though consisting principally of females, included many individuals distinguished for science and literature. It was attended, however, with complete success. Of Fontenelle, the first of those writers who have given a popular and engaging form to the lessons of philosophy, it is said by Voltaire:—

"L'ignorant l'entendit, le savant l'admira."

This praise was strictly applicable to Mr. Tennant. The great clearness and facility of his statements, the variety and happiness of his illustrations, and the comprehensive philosophical views which he displayed, were alike gratifying to every part of his audience. He delivered about four lectures, each of which were of great length; yet the interest of his hearers was never in the least suspended. Though his style and manner of speaking were raised

only in a slight degree above the tone of familiar conversation, their attention was perpetually kept alive by the spirit and variety with which every topic was discussed, by anecdotes and quotations happily introduced, by the ornaments of a powerful, but chastised, imagination; and, above all, by a peculiar vein of pleasantry, at once original and delicate, with which he could animate and embellish the most unpromising subjects.

The delivery of these lectures may be considered by some persons as a very trifling occurrence in the life of a man of science; but it has been thought well worthy of a place in the present narrative, not only as affording a new proof of the extent and variety of Mr. Tennant's powers, but because it exemplifies in a very pleasing manner one of the striking and amiable peculiarities of his character. As he had a remarkably clear perception of the most abstruse scientific truths, so he possessed a power of explaining and illustrating such subjects, which might justly be deemed unrivalled. Without any ostentation of learning, he had a peculiar delight in communicating knowledge to others; but especially, in unfolding the principles of science to young persons capable and desirous of receiving such information; and he partook with the most lively sensibility in the emotions of curiosity, pleasure and surprise, which his lessons seldom failed to inspire. He entirely differed from those who condemn, as trifling and superficial, that increasing taste for scientific knowledge in the higher and more opulent classes, to which many circumstances have lately contributed. He considered the diffusion of this taste among the young, the idle, and the wealthy, though liable in some cases to degenerate into affectation, as being in its general effects highly beneficial; both by affording to an important class of society additional sources of intellectual pleasure and new objects of rational pursuit; and indirectly, by obtaining for science and its professors a greater degree of public consideration and respect than they have enjoyed in any former age.

In the spring of the year 1813 Mr. Tennant delivered before the Geological Society a lecture on the principles of mineralogy. After giving an historical outline of the subject, and pointing out

the merits and defects of the principal writers by whom it had been systematically treated, he took an enlarged view of the science, regarding it as that branch of chemistry which treats of the definite compounds that are found native in the mineral kingdom, and whose crystalline forms and other properties are to be studied and described in the same manner as those of any other chemical substances. He then noticed several artificial productions which are analogous to those of nature; and amongst the rest, a silicate of copper, which he had formed by adding a solution of that metal to an acidified *liquor silicum*, which he conceived might perhaps be identical with the Siberian mineral called Dioptase.

Mr. Tennant had communicated to the Geological Society some time previously (in the year 1811) the result of his investigation of the native Boracic Acid, which he had discovered in a collection of volcanic substances from the Lipari Isles, and which has since been found in the island Volcano by Dr. Holland. This communication was published in the first volume of the Transactions of the Geological Society.

In the year 1813, a vacancy happening in the Chemical Professorship at Cambridge, he was urged by some of his friends resident in the University to become a candidate for that appointment. He was induced to accede to their solicitations, principally from thinking that the duty of delivering an annual course of lectures would furnish him with a motive of useful and honourable exertion. For a short time after he had declared himself, some opposition was apprehended on the part of a very respectable candidate resident in the University; and during this period the exertions which were made by Mr. Tennant's friends, and the assurances of support which he received, greatly exceeded what had ever been known on any similar occasion. The opposition being withdrawn, he was elected Professor in May, 1813.

During the months of April and May in the following year he delivered his first and only course of academical lectures, which was attended by a very numerous class of students. The greater part of these lectures were spoken from notes containing the order of the subjects, and the principal heads of discussion. But the intro-

ductory lecture was written at length, and still remains in manuscript. It presents a rapid and masterly outline of the history of chemistry, interspersed with many original and striking remarks on the nature of the science itself, on its extensive application and prodigious effects in promoting the civilization of mankind, and on the merits and discoveries of some of its most distinguished professors in different ages and countries.

The impression made by these lectures will not soon be forgotten in the University; and it is impossible, without the greatest regret, to consider the effects which a continuance of these labours during a series of years might have produced, not only in advancing chemical knowledge, but in diffusing a general spirit of philosophical research, and in promoting enlightened and comprehensive views upon all the various subjects with which the science of chemistry is more or less immediately connected.

In June, 1814, his two last communications were read to the Royal Society: the one upon an easier mode of procuring Potassium than that which is in common use; and the other on the means of procuring a double distillation by the same heat, which has been more than once alluded to in the course of this memoir.

The great variety of chemical subjects on which Mr. Tennant had been at different times engaged, but upon which his experiments were left incomplete, or insufficiently recorded, has been already mentioned. A brief notice of some of the most important facts which he ascertained, and of the principal series of experiments to which his attention was directed, would form an interesting part of the present memoir; but this, owing to various causes, and especially to the state of his papers, cannot as yet be attempted. Among the insulated facts, one of the latest was the making sugar from starch with oxalic acid, in the same manner as it had been made by M. Kirchoff with oil of vitriol; and the last chemical investigation to which he applied himself was an endeavour to ascertain from whence the Iodine found in several marine plants, is derived. On this he had laboured assiduously during the spring and summer of 1814; and early in September in that year, the evening before he left London, he mentioned to a friend that he had detected iodine in sea water. A tarnishing which he had observed in

silver leaf,* led him to promise himself a successful termination of these researches; but it is not known what were the decisive experiments by which he had succeeded in making this discovery.†

Mr. Tennant had always lamented his omission to visit the Continent of Europe during the short peace of 1802. He therefore took an early opportunity, after the general pacification of 1814, of passing over to France for the purpose of observing those changes which the eventful period of the last twenty years has produced, and of renewing his personal communications with men of science at Paris, from which he had been so long debarred. His own experience had taught him how much may be known, which has not been communicated in books. In this respect he was not disappointed; for in one of his letters, written a short time before he left Paris, he mentioned with much satisfaction how many interesting facts he had collected, which would enliven his Cambridge lectures.

He went to France early in September, 1814; and the following passage of a letter, in which he relates his first sensations, may be worth transcribing, both because it affords somewhat of a specimen of his general manner, and may perhaps recall to the recollection of

* The same test for iodine in iodic salts is proposed by Sir Humphry Davy in the Philosophical Transactions for 1814.

† Among the different series of experiments alluded to in this memoir, upon which Mr. Tennant had been engaged at various periods of his life, but which he had not brought to a completion, the following may deserve to be mentioned:

Researches on the pigments used by the ancients.

Experiments made with a view to improve the glass employed in the construction of achromatic lenses.

Experiments on the refractive powers of compound bodies compared with the refractive powers of their constituents.

Mr. Tennant had at one time very nearly obtained an insight into the wonderful class of phenomena belonging to Voltaic electricity; as appears from the following extract from an old note-book, in which there is no date; but Mr. T. always spoke of the experiment as having been made many years since.

"If a piece of silver or gold is immersed in a solution of vitriol of copper, and the silver or gold is *touched* with iron or zinc, the copper is diffused upon them around the point of contact; upon platina, not so easily; the iron, though very near, occasions no precipitate upon the silver or gold; but if iron touches silver, and silver gold, the latter gets the copper."

his friends several of his favourite topics and opinions. "After a short and favourable passage of three hours and a half, we got into the harbour of Calais, with its immense pier. The difference of every thing struck me prodigiously. I felt quite intoxicated with the novelty of the scenery, the abundance of the country, the bright blue sky without a cloud, and the broad magnificent roads, with elms, and sometimes fruit-trees, on each side for fifty miles. I was a little mortified on comparing the climate with our own, till I observed the many points in which its advantages were neglected; open fields; harvest not finished, as in England; corn full of weeds; and oats more than one-third inferior in quality to my own at Mendip. On approaching Paris, the vineyards were new features of this superior climate. At Paris, what strikes one most is the narrowness of the streets; along which as I passed, I was in constant expectation of getting out of the eternal *lanes*. Now I am quite reconciled to them.—The backward state of civilized life is more apparent here than in the country. You are struck with the imperfection of every thing, and the mixture of dirt and meanness with pomp and expence. In the theatres, (which, however, are quite inferior to ours in size, and still more in elegance,) you see in the passages behind the boxes, dirty pavements of brick with wide cracks; and the boxes are opened by a few old women, who are employed during the intervals in knitting or mending stockings. The women are such as might be taken from a field in England, where they would be employed in weeding."

During his stay in France, Mr. Tennant, in the months of October and November, made a tour into the southern provinces, which he had not before seen, and visited Lyons, Nismes, Avignon, Marseilles, and Montpellier. He was much gratified by this journey, during which he made many interesting remarks on the state of the country, paying particular attention to mineralogy and agriculture. In his letters written about this time he describes in striking terms the feelings of enjoyment, which he always experienced from new scenes and objects, and especially from viewing the productions of Nature in southern climates. In speaking of the range of mountains from whence the Saone takes its rise, he says,

"The country is the most rich and picturesque that can be imagined; but the contrast of the beggary and dirt of the towns and common habitations with the rich vegetation of the country is universal, with the exception only of towns of the first rate. I am not yet sufficiently at home in the political economy of the country to say on what this depends. In part, on its extreme population.—After passing these mountains, a new world appears, marked with the characters of a southern climate. The race of people is different, with finer skins than in the North. The country women wear immense hats, to defend them from the sun; and the houses (there being no snow) have low pitched roofs, like those in Poussin and Claude Lorraine. Nothing can be more beautiful than this style of building, which continues to the Mediterranean.—Proceeding south, vines and mulberries chiefly cover the ground; and following the Saone, its mountainous banks, studded with country houses, almost buried in the rich vegetation of figs, mulberries, vines and pomegranates, exceed all anticipation. Suppose the scenery of the hot wells at Bristol extended 50 miles, with a broader rapid river, higher mountains, under a glowing climate, and thickly set with white cottages, intended to be copied by a painter. Nothing is so fine as the situation of Lyons, and the views into the paradisiacal valley from the mountains on each side of the town. This wonderful scenery continues along the Rhone by Vienne (from whence comes the Coté rotie wine), and Tain (from whence Hermitage), till you arrive in Provence, where the olive, a new production of the southern climates, begins to make its appearance. Through this rich garden or forest you come to the calcareous mountains, which on their summits are white rocky hills, covered with wild plants, thyme, rosemary, lavender, ilex, quercus coccifera, and innumerable plants unknown in our latitude, but which I hope to raise in England next year, to renew my impressions of this country. These mountains enclose the valley of that wonderfully situated, immense town of Marseilles. As you descend, the Mediterranean appears, and the great city with its endless suburbs in the hollow vallies sloping towards the sea. * * * * It was with infinite regret that I left Marseilles; if I could stay the winter, it should be there.

Avignon is pleasingly situated; Nismes has fine antiquities; Montpellier is in a rich and plentiful country; but they are all *triste* and dead compared with Marseilles, where every attraction is united."

On his return from Montpellier to Paris, he writes, while stopping for a few days at Lyons; "At Montpellier I had the peculiar advantage of a most attentive acquaintance (M. Berard), who is one of the best chemists in France. The country affords few such; but he was brought up at the feet of Berthollet, who gave me a letter to him. He succeeded to the chemical works of Chaptal, which are now very extensive, and carried on with great intelligence.—On my return I visited the great Roman aqueduct of the Pont du Gard, so striking for its antiquity, its altitude, its solidity, and the very romantic situation where it passes over the valley and river. Pont St. Esprit is hardly less interesting, being of such immense extent (more than half a mile), and the lowest bridge on the Rhone. It was built, not by the Romans, but in the darkest ages, by the powers of superstition, the great principle of energy and exertion at that period. In the year 1265 the offerings to the convent of St. Esprit were sufficient for this undertaking, and were thus applied by the monks, with honour to themselves, and with great advantage to a remote posterity; for the passage over it is immense at this time.—I stopped for half a day at Tain, from whence we have the Hermitage wine. Nothing can be more beautiful than the gold colour of the 'vine-covered hills,' nor more extraordinary than the sand or gravel in which the plant grows. There is not a particle of soil, but merely broken, sharp fragments of granite, chiefly felspar, perfectly clean; for though the roots of the vine are manured once a year, this totally disappears. The gravel soil is supported by walls. From the top are seen endless mountains, which border on the Rhone, and which along the slopes facing the south are yellow with vines, in spite of the extreme barrenness of the soil. Such mountains, which are here among the most valuable parts of the kingdom, would not in England be worth a penny an acre.—From this place (Lyons) we rode the other day into the mountains near Arbresle to see a new copper-mine, consisting of a blue carbonate; compared with which the specimens from Siberia are quite insignificant. * * * *"

Mr. Tennant returned to Paris during the month of November, 1814, and was to have returned to England about the latter end of the year. But he continued to linger on till February following. On the 15th of that month he reached Calais; and wrote from thence on the next day, to account for his long delays; which had been occasioned, he said, "by his postponing the disagreeable exertion of setting off, added to the severe weather, and the odious view of the ocean, of which he had so great a horror, that it darkened the agreeable prospect of meeting his friends in England."

The wind then blew directly into Calais harbour, and continued to be unfavourable for several days. After waiting till Monday, the 20th, he went to Boulogne, in company with Baron Bulow, a German officer, who was also going to England, in order to take the chance of a better passage from that port. They embarked on board a vessel on the morning of February the 22d; but the wind was still adverse, and blew so violently that the vessel was obliged to put back. When Mr. Tennant came on shore, he said, "that it was in vain to struggle against the elements, and that he was not yet tired of life."

It was determined that, in case the wind should abate, another trial was to be made in the evening. During the interval, Mr. Tennant proposed to the Baron that they should hire horses, and take a ride. They rode at first along the sea side; but on Mr. Tennant's suggestion, they went afterwards to Buonaparte's Pillar, which stands on an eminence about a league from Boulogne, and which, having been to see it the day before, he was desirous of shewing to Baron Bulow.

On their return from thence, they deviated a little from the road, in order to look at a small fort near the pillar, the entrance to which was over a Fosse 20 feet deep. On the side towards them there was a standing bridge for some way, till it joined a draw-bridge which turned upon a pivot. The end next to the fort rested on the ground. On the side towards them it was usually fastened by a bolt; but the bolt had been stolen about a fortnight before, and was not replaced.

As the bridge was too narrow for them to go abreast, the Baron said he would go first, and attempted to ride over it. But perceiving that it was beginning to sink, he made an effort to pass the

centre, and called out to warn his companion of the danger; but it was too late—they were both precipitated into the trench. The Baron, though much stunned, fortunately escaped without any serious hurt; but on recovering his senses, and looking round for Mr. Tennant, he found him lying under his horse, nearly lifeless.

He was first conveyed to a cottage, inhabited by the person who has the care of the pillar; and medical assistance being procured from Boulogne, it was found that his skull and one of his arms were dreadfully fractured, and that there was no hope of his recovery. He was taken, however, to the Civil Hospital, as the nearest and most convenient place to receive him. After a short interval, he seemed in some slight degree to recover his senses, and apparently made an effort to speak, but without effect; and died within an hour.—His remains were interred a few days afterwards in the public Cemetary at Boulogne, being attended to the grave by most of the English residents.

Mr. Tennant was tall and slender in his person, with a thin face and light complexion. His appearance, notwithstanding some singularity of manners, and great negligence of dress, was on the whole striking and agreeable. His countenance in early life had been singularly engaging; and at favourable times, when he was in good spirits and tolerable health, was still very pleasing. The general cast of his features was expressive, and bore strong marks of intelligence; and several persons have been struck with a certain degree of resemblance in his countenance to the well-known portraits of Locke.

The leading parts of his moral and intellectual character are apparent in the principal transactions of his life. But in this memorial, however imperfect, of the talents and virtues of so extraordinary a man, some attempt must be made to delineate those characteristic peculiarities, of which there are no distinct traces in the preceding narrative.

Of his intellectual character, the distinguishing and fundamental

principle was good sense; a prompt and intuitive perception of truth, both upon those questions in which certainty is attainable, and those which must be determined by the nicer results of moral evidence. In quick penetration, united with soundness and accuracy of judgment, he was perhaps without an equal. He saw immediately and with great distinctness, where the strength of an argument lay, and upon what points the decision was ultimately to depend; and he was remarkable for the faculty of stating the merits of an obscure and complicated question very shortly, and with great simplicity and precision. The calmness and temper, as well as the singular perspicuity, which he displayed on such occasions, were alike admirable; and seldom failed to convince the unprejudiced, and to disconcert or silence his opponents.

These powers of understanding were so generally acknowledged, that great deference was paid to his authority, not only upon questions in science, but upon most others of general interest and importance. What Mr. Tennant thought or said upon such subjects, his friends were always anxious to ascertain; and his opinions had that species of influence over a numerous class of society, which is one of the most certain proofs of superior talents.

Next to rectitude of understanding, the quality by which he was most distinguished, was a lofty and powerful imagination. From hence resulted a great expansion of mind and sublimity of conception; which, being united with deep moral feelings, and an ardent zeal for the happiness and improvement of mankind, gave a very peculiar and attractive character to his conversation in his intercourse with familiar friends. He partook with others in the pleasure derived from the striking scenes of nature; but was more particularly affected by the sight or contemplation of the triumphs of human genius, of the energies of intelligent and successful industry, of the diffusion of knowledge and civilization, and of whatever was new and beautiful in art or science. The cheerful activity of a great commercial or manufacturing town, the improvements in the steam-engine, the great Galvanic experiments, and, above all, the novelty and extent of the prospects afforded by that revolution in chemical science, which has illustrated our own age and country

—these magnificent objects, when presented to Mr. Tennant's mind, excited in him the liveliest emotions, and called forth the most animated expressions of admiration and delight.

This keen sensibility to intellectual pleasure may be partly understood from the following passage of a letter written by him in January 1809, to an intimate friend who was then abroad. After mentioning the great phenomena of the decomposition of the alkalies by Voltaic electricity, and giving a striking, though general, view of the experiments founded upon them, he thus concludes: "I need not say how prodigious these discoveries are. *It is something to have lived to know them.*"

His taste, which was highly cultivated both in literature and the fine arts, partook in a considerable degree of the peculiar character of his imagination. His favourite writers (those whom he most valued for the eloquence of their style) were such as describe "high actions and high passions," and have the faculty of exciting strong and deep emotions. Of the poets, he principally esteemed Virgil, Milton, and Gray; and the prose writers to whom he gave the preference for powers of composition, were Pascal and Rousseau. He had a particular admiration of that extraordinary work, the "Pensées de Pascal," regarding it as a production altogether unequalled in energy of thought and language, in occasional passages of refined and deep philosophy, and, above all, in that sublime melancholy, which he considered as one of the peculiar characteristics of great genius.

The same principles governed Mr. Tennant's judgments in the fine arts. Considering it as their proper office to elevate the mind, and to excite the higher and nobler passions, he estimated the merits of the great masters in music and painting by their power of inspiring these emotions. What he particularly admired in musical compositions, was that tone of energy, simplicity and deep feeling, of which the works of Handel and Pergolesi afford the finest specimens.* In painting, he awarded the superiority to those

* In Mr. Tennant's conversations on this subject, he often alluded to a remarkable passage in Rousseau's Musical Dictionary (the article "Génie") in which that celebrated writer describes with his own peculiar eloquence the feelings produced

distinguished masters, of whom Raphael is the chief, who excel in the poetical expression of character, and in the power of representing with spirit, grace and dignity, the most exalted sentiments and affections.

It was almost a necessary consequence of his intense and deep feeling of these higher beauties, that his taste was somewhat severe, and that his ideas of excellence, both in literature and the fine arts, were confined within strict limits. He totally disregarded mediocrity, and gave no praise to those inferior degrees of merit from which he received no gratification.

It may be mentioned among the peculiarities of Mr. Tennant's literary taste, that in common perhaps with most other original thinkers, he bestowed little attention on books of opinion or theory; but chiefly confined himself to such as abound in facts, and afford the materials for speculation. His reading for many years had been principally directed to accounts of voyages and travels, especially those relating to Oriental nations; and there was hardly any book of this description, possessing even tolerable merit, with which he was not familiarly conversant. His acquaintance with such works had supplied him with a great fund of original and curious information, which he employed with much judgment and ingenuity, in exemplifying many of his particular opinions, and illustrating the most important doctrines in the philosophy of commerce and government.

In consequence principally of the declining state of his health, his talents for conversation, by which he was always much distinguished, were perhaps less uniformly conspicuous during his latter years. His spirits were less elastic, and he was more subject to absence or indifference in general society. But his mind had lost none of its vigour; and he never failed, when he exerted himself, to display his peculiar powers. His remarks were original; and his knowledge, assisted by a most retentive memory, afforded a perpetual supply of ingenious and well-applied illustrations. But

by great musical compositions, considering the capacity of receiving such emotions as the true criterion of musical genius. Mr. T. was also accustomed to speak of Avison's Treatise on Musical Expression in terms of high praise.

the quality for which his conversation was most remarkable, and from which it derived one of its peculiar charms, was a singular cast of humour; which, as it was of a gentle, equable kind, and had nothing very pointed or prominent, is hardly capable of being exemplified or described. It seldom appeared in the direct shape of what may be called *pure humour*, but was so much blended either with wit, fancy, or the peculiarities of his own character and manners, as to be in many respects entirely original. It did not consist in epigrammatic points or brilliant and lively sallies; but was rather displayed in fanciful trains of imagery, in natural, but ingenious and unexpected, turns of thought and expression, and in amusing anecdotes, slightly tinged with the ludicrous. The effect of these was much heightened by a perfect gravity of countenance, a quiet, familiar manner, and a characteristic beauty and simplicity of language. This unassuming tone of easy pleasantry gave a very peculiar and original colouring to the whole of his conversation. It mingled itself with his casual remarks, and even with his graver discussions. It had little reference to the ordinary topics of the day, and was wholly untinctured by personality or sarcasm.

Of his leading practical opinions, sufficient intimations have been given in the course of the preceding narrative. They were of a liberal and enlightened cast, and such as might be expected from his warm benevolence, and from the character of his genius and understanding. Although singularly indifferent to the details and occurrences which occupy so large a part of ordinary conversation, he felt a degree of interest respecting measures and events of real public importance, such as is rarely experienced even by those most actively engaged in political life. The folly and miseries of war, the evils of unenlightened legislation, and the waste of human happiness occasioned by the ignorance and narrow views, much more than by the criminal designs or culpable indifference, of the rulers of mankind, he deeply felt and lamented. Among the principles which he most cherished, was an ardent, but rational, zeal for civil liberty, which he sometimes represented as his ruling passion; although it was not, in him, a mere effusion of generous feeling, but the result of philosophical reflection united

much practical observation. His attachment to the general principles of freedom originated from his strong conviction of their influence in promoting the wealth, virtue and happiness of nations. A due regard to these principles he considered as the only solid foundation of the most important blessings of social life, and as the peculiar cause of that distinguished superiority, which our own country so happily enjoys among the nations of Europe.

Of his moral qualities, it is scarcely possible to speak too highly. He described himself as naturally passionate and irascible, and as roused to indignation by any act of oppression or wanton exercise of power. The latter feeling he always retained, and it formed a distinguishing feature of his character. Of his irritability, a few traces might occasionally be discovered; but they were only slight and momentary. His virtuous dispositions appeared on every occasion, and in every form, which the tranquil and retired habits of his life would admit of. He was actuated by a high sense of honour and duty; and was remarkable for his kindness and benevolence, especially towards inferiors and dependents. But his merits were most conspicuous in the intercourse of social life. His amiable temper, and unaffected desire of giving pleasure, no less than his superior knowledge and talents, had rendered him highly acceptable to a numerous and distinguished circle of society, by whom he was justly valued, and is now most sincerely lamented. But the real extent of his private worth, the genuine simplicity and virtuous independence of his character, and the sincerity, warmth and constancy of his friendship, can only be felt and estimated by those, to whom he was long and intimately known, and to whom the recollection of his talents and virtues must always remain a pleasing, though melancholy, bond of union.

THE END.

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