

The author commenced by stating at some length, the nature of Wollaston's argument, the object of which was to affirm that the limitation of the earth's atmosphere justified the conclusion, that the air consists of indivisible particles or true atoms. He then discussed the opinions which have been offered by Daubeny, Dumas, Whewell, and others, as to the validity of Wollaston's conclusion, and stated that the special object of his communication was to shew that the inference from the existence of a limit to the atmosphere, that matter is only finitely divisible, is quite unwarranted.

Wollaston, he observed, had only succeeded at the utmost in establishing, that the atmosphere consists of a finite number of mutually repelling molecules, without supplying, or even offering any proof, that these molecules were true atoms. The author urged that the repelling molecules of the carbonic acid and water in the atmosphere, are certainly not atoms, but groups of several particles; and that, for anything we can prove to the contrary, the molecules of oxygen may be equally or even more complex; and farther, that even if it could be shewn that oxygen and nitrogen are chemically homogeneous, it would not entitle us to assume that their repelling molecules were single atoms instead of groups of several, since we have no means of estimating what the complexity of a gaseous molecule may be. The author concluded by stating, that Wollaston's argument left the question of the finite or infinite divisibility of matter exactly where it found it.

2. Biographical Notice of the late Professor Henderson, By Professor Kelland.

In undertaking the task which has been assigned me, of laying before the Society a brief history of the life and labours of one of their most valuable members, I am influenced as much by my regard for the deceased, as by my duty to the Society. I feel that, in a place where I am a comparative stranger, I have lost a friend—a loss the greatness of which can only be appreciated by those who have experienced, as I have done, the integrity of his character, and the warmth of his heart. Mr Henderson was a man whose every action was the dictate of a right conscience. With society, his intercourse was marked by an utter want of selfishness—a rare characteristic; with his friends, it was stamped with true and unostentatious kind-heartedness. He was ready and happy, at all times, to lend them aid, or afford them sympathy in every difficulty,

scientific or social. That his eulogy has fallen to the lot of one so little qualified to do it justice, I sincerely regret; but I lament it the less when I reflect, that in other quarters it has found the able advocacy of my friend Mr Galloway, and that both he and myself have had the invaluable assistance of Mr William Ivory.

Thomas Henderson, Professor of Practical Astronomy in our University, and Astronomer-Royal for Scotland, was born in Dundee on the 28th of December 1798. His father died early in life, leaving five children, of whom he was the youngest, to the care of his widow. His eldest brother having been bred to the law, and seeing prospects of success before him, destined his brother Thomas for the same profession. Accordingly, having received an excellent preliminary education at the grammar school of Dundee, he was sent, at the age of thirteen, to the academy of that town, where he remained two years under the able tuition of the present Professor Duncan of St Andrews. Here he acquired the rudiments of mathematics and natural philosophy, in which he made such progress as to merit being styled by the Professor one of the best scholars he ever had under his care. Even at this time his predilection for astronomy had developed itself; but it cannot be supposed that his acquirements sufficed to enable him to do more than manifest a partiality towards that science. In 1813 he was placed with Mr Small, writer, afterwards town-clerk of Dundee. He now bestowed considerable attention to the decyphering of the manuscripts, and particularly the ancient records of the burgh. He also laboured hard in the acquirement of an accurate knowledge of history and chronology, for which his remarkably retentive memory well qualified him. At the age of twenty-one he repaired to Edinburgh, to pursue his legal studies, and entered the office of Messrs J. and W. Murray, W.S. While in their employment, an application was made to him to undertake the arrangement and classification of the Records of the Burgh of Dundee—a work for which he was amply qualified, and which he satisfactorily performed. His abilities and business habits recommended him to the good offices of Mr Gibson-Craig, who became his patron, and ever remained his steady friend. At his recommendation, he acted as clerk to the late Lord Eldin, both prior and subsequent to his elevation to the Bench. After his Lordship's resignation, Mr Henderson accepted the office of secretary to the Earl of Lauderdale, in which capacity he visited London, where he made the acquaintance of the principal astronomers of the metropolis, from whom he received great kindness. In particular, Sir James

South gave him access to his observatory, and thus enabled him to familiarize himself with the use of instruments.

But it is to Professor Wallace, ever his steady friend, under whose care the Observatory of the Edinburgh Astronomical Institution was then placed, that he owed his rapid progress in astronomy, if not his ultimate adherence to the science. Finding in Mr Henderson a zeal for the study, and an ambition to distinguish himself in it, Mr Wallace, with his accustomed disinterestedness, unhesitatingly placed the Observatory at his command, and thus afforded him the means of acquiring that practical skill for which he was celebrated. To this circumstance I attribute much of Mr Henderson's success in astronomy. However true it be, that talent will develop itself in spite of obstacles, it is no less certain, that, in sciences like this, which owe so much to the external aid of expensive instruments, the fortuitous circumstance of an access to the requisite machinery, is a strong stimulus to exertion, without which few would undergo the drudgery of acquiring a mastery of the practical details of the science. With an observatory at his disposal, Mr Henderson saw the road to eminence in practical astronomy open before him, and he hesitated not to labour zealously to fit himself for the walk to which his inclinations prompted him.

As might be supposed, he had not long entered on a systematic course of reading, ere improvements suggested themselves to his acute mind. The first which he made public, relates to the computation of an observed occultation of a fixed star by the moon. This he transmitted to Dr Thomas Young, then secretary to the Board of Longitude in 1824. It was published by him in the *Nautical Almanac* for 1827 and the four following years; and Mr Henderson received the thanks of the Board for his communication. This paper, and many others of his, were likewise inserted in the *Quarterly Journal of Science*. It is probable that the subject which actually brought Mr Henderson into notice with astronomers, was his detection of an error in the *data* furnished to Mr Herschel for the determination of the difference of longitude of London and Paris. His paper on this subject was published in the *Philosophical Transactions* for 1827, and the Royal Society voted him a copy of the Greenwich Observations, in return for his labour. This communication had also the effect of procuring for him the friendship of Mr Herschel, whose estimate of its importance is expressed in a testimonial which he gave Mr Henderson in 1829, when candidate for the chair of Practical Astronomy, in the following

terms :—“ I . . . assure you . . . how highly I appreciate your astronomical acquirements, especially your habits of accurate and scrutinizing calculation. I have, on a former occasion, experienced the value of this investigating spirit and laborious industry, in your detection and correction of an error overlooked by myself in the statement sent me from the Royal Observatory, relative to the operations for determining the difference of longitude of Greenwich and Paris in 1825—a correction which had the effect of raising a result, liable to much doubt from the discordance of the individual day’s observations, to the rank of a standard scientific *datum* ; and thus conferring on a national operation all the importance it ought to possess.”

Thus flattering was Mr Henderson’s first connection with the Royal Society ; nor was his reception by the Astronomical Society less so. In 1828, he prepared an ephemeris for 1829, of the occultations of *Aldebaran* by the moon, for ten different observatories in Europe. In return for this and other valuable communications, the Society presented him with a copy of their Transactions, handsomely bound.

Mr Henderson’s reputation as an astronomer was now fully established, and it was his own wish and the desire of his friends, that he should be placed in a situation more congenial to his favourite pursuit. Two such situations presently opened ; to neither of which, however, was he immediately appointed. The Town-Council of the city of Edinburgh had granted to Mr Short, in 1776, a lease of a portion of ground on the Calton Hill, on the condition that an Observatory should be erected on it ; but it was not until about forty years afterwards that any instruments adapted to astronomical purposes were placed there, and even then the want of funds prevented it taking its place as an operative establishment. Some years prior to the time of which we speak, a number of gentlemen formed themselves into a society, under the designation of the Edinburgh Astronomical Institution, and by their exertions procured the erection of the present building. Having exhausted their funds, they applied to Government for a grant, which they succeeded in obtaining. From the want of endowment, however, the business of the observatory was somewhat irregularly conducted. In 1828, Dr Robert Blair, Professor of Practical Astronomy in the University of Edinburgh, died. The office had hitherto been a sinecure, and it occurred to many interested in the science, that it might be made useful by the appointment of a person qualified to perform the duties of a practical observer ; and that,

consequently, this vacancy was a favourable opportunity for uniting the professorship with the observatory. As might have been expected, great exertions were made to place Mr Henderson in the situation, but, for the present, ineffectually, from the circumstance that the Government had resolved to postpone any appointment, until it had been maturely considered on what footing the professorship could be placed, with the greatest prospect of success to the science of astronomy. Another opening occurred within a few months of this, occasioned by the death of Dr T. Young. Shortly before his decease, he delivered to Professor Rigaud of Oxford, a memorandum, recommending Mr Henderson as his successor in the superintendence of the Nautical Almanac. The appointment did not take place, but there exists perhaps no higher testimony to Mr Henderson's merit than this recommendation, when it is remembered that it arose out of his scientific reputation, altogether unaffected by private friendship, and that Dr Young ranks among the very highest of the philosophers of the present century.

Although disappointed in the instances we have mentioned, a situation shortly fell in Mr Henderson's way, which appeared likely to establish him in a suitable manner. On the death of Mr Fallows, the astronomer at the Cape of Good Hope, his qualifications were so well known to the parties with whom the appointment lay, that the office was offered to him without any solicitation on his part, or application on that of his friends. Mr Henderson accepted the appointment, and sailed for the Cape in January 1832. Immediately on his arrival there, he entered on his duties with ardour; and so indefatigable were his exertions that he amassed a most valuable series of observations, and found time, besides, to prepare and transmit to the Royal and Astronomical Societies, various papers connected with the science. The principal results of his labours at the Cape were, the determination of the latitude and longitude of his station—of the positions of stars near the South Pole, for fixing the polar positions of his instruments—of the amount of refraction near the horizon—and of the moon's horizontal parallax; together with observations on the planet *Mars*, for the purpose of computing his parallax, and that of the sun—of Encke's and Biela's comets—of occultations of fixed stars by the moon—of a transit of *Mercury*—and of between 5000 and 6000 declinations. Prior to his appointment to the Cape Observatory, Mr Henderson had had slight symptoms of a disease of the heart, and he soon found that the labours and anxieties incident to his position, together with the serious disadvan-

tages attendant on the building in which he was compelled to reside, rendered it impossible that he should retain the situation. Accordingly, in a letter, dated May 27. 1833, he tendered his resignation to the Lords of the Admiralty, adding that, on his return to England, he would immediately proceed to the task of calculating and reducing the various observations he had made, and of extracting from them those useful results they were intended to afford.

Amongst the other annoyances to which Mr Henderson was subject at the Cape, may be mentioned that, which had been the source of much vexation to his predecessor, the state of the mural circle. Mr Fallows had found remarkable anomalies amongst the readings of the several microscopes, in different positions of the instrument, during a revolution upon its axis; whence he had been led to infer that it had suffered a change of figure since leaving the maker's hands. Mr Henderson's first employment was the rigid investigation of these anomalies, the results of which are printed in the eighth volume of the *Memoirs of the Astronomical Society*, p. 141. He came to the conclusion, that the anomalies proceeded partly from an oval form which the instrument had acquired, and partly from variations in the position of the centre of the instrument while revolving, relative to the microscopes, owing probably to the pivots not being exactly circular; whilst, in addition, the whole instrument frequently changed its position upon the pier, from the Y support of the front pivot not being perfectly steady. He agreed, moreover, with Mr Fallows in concluding, that the mean of the readings of six microscopes is little, if at all, affected by these causes; so that, on the whole, it appeared that the degree of accuracy to be obtained from the instrument was not inferior to that given by the best instruments of similar construction hitherto made. The conclusion of the matter is this:—on the circle being brought to this country and examined by Mr Simms, it was found that the large steel collar carried by the conical axis was quite loose;—“a child's hand could turn it.”

On Mr Henderson's return to Edinburgh he set about reducing his own observations; a task voluntarily imposed on himself, and one which he sacrificed his own interests to fulfil. No long period elapsed, however, before a situation opened, in every way suited to his taste. An agreement was entered into between the Commissioners of the Treasury and the members of the Astronomical Institution of this place, whereby the latter gave their observatory and instruments to the use of the Professor of Practical Astronomy in the University,

and the former agreed to supply a salary to the Professor. Mr Henderson was selected as the proper person to occupy this situation ; and he entered on the duties of the office in October 1834. The value of the observations which he made during the ten years he held this appointment is too well known to need comment. But Mr Henderson did not confine himself to the routine of Observatory duties, important as they are. No sooner had he got the Institution into working order, than he again vigorously attacked his Cape observations, and laid the results before the world. He commenced by communicating to the Astronomical Society a valuable catalogue of the mean declinations of 172 principal fixed stars for January 1. 1837. This was followed by a memoir on the refraction of stars near the horizon, in which he concludes, that no difference of refraction north and south of the zenith appears as far as to 88° of zenith distance. Another very important communication of Mr Henderson's was the determination of the equatorial horizontal parallax of the moon. This is best effected by the comparison of results north and south of the equator. It is well known, that to obtain it by this method, was one of the chief objects of La Caille's voyage to the Cape in the middle of the last century. Ever alive to the interests of the science, Mr Henderson determined to avail himself of his own position when at the Cape, to repeat the observations. The result to which he arrives is extremely satisfactory, differing as it does but slightly from La Caille's.

These and similar labours place Mr Henderson high in the estimation of astronomers. But something more is requisite to give a man interest in the eyes of the world at large. In the field of science, many a patient cultivator who has conferred a real boon on mankind has been altogether forgotten. The successful opening of some unexplored district, or the discovery of some popularly interesting fact, confers, and properly confers, a wide-spread fame. The development of scientific knowledge, as of every thing relating to the preparation of the races of mankind for their future destinies, is regulated by an All-wise hand, which, whilst it dispenses sufficient to satisfy each generation as it passes, kindly holds back an inexhaustible store to supply the intellectual cravings of races yet to follow. The natural sciences have not yet (as a philosopher unwisely asserted a century ago they had) nearly attained their ultimate perfection ; and doubtless are not destined soon to do so. Hence, whoever is privileged to make a discovery, however trifling, is worthy of respect, as having contributed towards the fulfilment of

vast designs, slowly but steadily progressing towards their accomplishment. Should the investigation of the parallax of *α Centauri*, which Mr Henderson gave to the world, turn out correct, of which there is, at present, little doubt, then shall we claim for him the distinction which I have marked with honour—the distinction of having extended astronomical measures beyond the limits of our system.* Nor will it diminish his fame that a similar determination was attempted before, or that an equally successful one was nearly contemporaneous with his own. In few cases has an individual made a successful essay, without having been preceded by others, not destined to reach the goal, or accompanied by some one, to share the honour. There is reason to fear, that, in the present instance, whatever honour is due will fall to the lot of another. It is to be regretted, that (whether the conclusion shall ultimately be verified or not) no scientific award was made him, in consideration for the skill displayed; whilst his contemporary received for his labours a medal from this country. Let us hope that his reward will be the association of his name with the discovery.

There is another point wherein, as Mr Henderson's advocate, I

* On this subject I beg to refer to my friend Mr Main's admirable memoir in the *Transactions of the Astronomical Society*, v. . . . It may be interesting to add the following remarks from a private communication of his to myself:—"At the time when I was requested to draw up a memoir on the subject of annual parallax, the amount of evidence of its sensible existence for any star whatever, which had even arisen from the discussion of investigations previous to Bessel's, was exceedingly small; and I believe that, at that time, any new attempt was likely to be received with the smile of incredulity, which repeated failures will always, in the long-run, tend to produce. No sensation was caused in England by the announcement of Bessel's investigation; and I remember that, to some astronomers, his confidence in the certainty of his result seemed far from warranted. At present there exists very little scepticism with respect to our knowledge of the parallax of 61 Cygni. But it was deduced by a method with which English astronomers were, I may assert, in general, unfamiliar, perhaps through the want of a good heliometer. . . . It was an evidence of very creditable faith, therefore, which induced Mr Henderson, in default of other means, to attack this star rigorously by meridian observations in both elements, and this notwithstanding his accurate knowledge (for no man living excelled him in his knowledge of every thing that had been done in every department of modern practical astronomy, from its commencement) of that total failure of every attempt that had been made under the ablest astronomers of this country, in the northern hemisphere. And so fully was he impressed with the conviction of his ultimate success, that he left it as a legacy to his successor, who has sent over a very complete and beautiful series of observations, which, after their discussion by Mr Henderson himself, not long before his decease, has, in the minds of many, pretty nearly decided affirmatively the question of the existence of a considerable parallax."

would assert his claims to reward. During a long series of years, he devoted much of his leisure time to the reduction of the Cape Observations, which having been made in a public observatory, it was the duty of the public to present in a proper shape to the world. Mr Henderson performed this duty with no other remuneration than the satisfaction derived from giving a perfect form to his own results. We lament, however, that his infant daughter will reap none of the fruits of that excessive midnight toil which hastened her father's progress to the grave, more especially as she is an orphan indeed—deprived of both her parents. To the memory of her mother, who died shortly after her birth, it is fit I should pay a tribute. She was the daughter of Mr Adie, the celebrated optician of this city. In his selection of this lady as his partner, no less than in the other acts of his life, Mr Henderson manifested the soundness of his judgment. She was in every way suitable for him. A member of a talented family especially devoted to scientific pursuits; herself gifted with a mind of great capacity, which a liberal education had cultivated and refined; of an amiable disposition and a cheerful temperament, she was well fitted to sympathise with the depressions of a spirit weighed down with fatigue, or to brighten those passages of life, which, without her aid, would have appeared gloomy. Add to this, that her attainments were considerable; so much so as to render her not only capable of appreciating and admiring her husband's ardour and enthusiasm in his favourite studies, but even of occasionally assisting him in the prosecution of them. Under these circumstances, it need scarcely be said that their union was a happy one. Her death, at a time when their fondest wishes seemed realized in the birth of a daughter, was a shock from which he never recovered. His manner, which had always been deficient in buoyancy, became from that moment solemn. In anticipations of the future, he rarely indulged; in a melancholy retrospect of the past, too often. This, added to his late habits, preyed rapidly on his constitution, and hastened his death. He expired on the 23d of November 1844, of a disease of the heart.

To draw his character—scientific or social—is an easy and a pleasing task. As an observer, he was ingenious and accurate—in testimony of which it is sufficient to say, that his observations carry the entire confidence of every astronomer in Europe. On this head, I cannot do better than allow one of their number (Mr Main) to speak for me. He says, “The praise of being the first discoverer of our distance from a fixed star, even should it be ultimately esta-

blished, though a brilliant addition to his fame, is not precisely that which will cause his name to be remembered with gratitude by every one who understands what ought to be the routine duty prescribed to himself, and practised by the astronomer. His business in general—his every-day work—is not speculative, but practical; not conversant, except, by the way, with the almost despaired-of problems of the science, but with the establishment of the data which belong to his epoch. He is to fix, with indisputable accuracy, the places of the most remarkable of the stars; he is to bring his contribution to the perfecting of the lunar and planetary tables; he is to assist in the measurement of our own planet, as the basis of all our ulterior comparisons; and he must do this by submitting to a routine, whose irksomeness and labour no one can appreciate but himself. Professor Henderson did all this in a way which lays just claim to the gratitude of succeeding astronomers; his speculations on our connection with the sidereal system were but the recreations of a mind that never swerved from the amount of toil imposed by the less dignified, but more useful occupations of the astronomer. His observations, followed up as they have been by Mr Maclear, will be the basis of all the astronomy that is peculiar to the southern hemisphere; and it is to his results, that the astronomers of the next age will look for the facts of their science.”

I apprehend, however, that no slight foundation of Mr Henderson's future fame, will be found to rest on the admirable use which he made of his own observations. Having acquired a thorough knowledge of all that had been done, and all that was desirable in astronomy, he was ever on the alert to seize any opening which the circumstances under which these were made, might seem to offer. Witness his memoirs on refraction, and on the parallax of the moon, which were suggested by the position of the observatory in which he was at that time placed. The arguments, too, from which his conclusions were drawn, are marked by singular perspicuity and acuteness. The standard which he adopted in mathematical reasoning, was the works of Euler. Not many days before his death, I found him reading some book of travels, and on expressing my pleasure at finding him so employed, he remarked, “I should very much prefer a volume of Euler, but I cannot get at it.” In astronomy he looked upon Bessel as his model, almost as his master. It was my good fortune to participate in his entertainment of that distinguished astronomer, as we had previously united in the reception of Encke. I would fain efface from my memory the pleasure

we experienced on both those occasions. In the case of Bessel, his was the delight of a son who had found a father. He hung on his words and watched his looks with a mingled feeling of affection and pride. That he profited by studying the writings of these great men, his own researches sufficiently testify. His path lay not in the complex analytical investigations of the French school; but what he professed, he was profoundly acquainted with. His natural modesty appears nowhere to greater advantage than in his sternly disclaiming all pretensions to knowledge with which he was only partially acquainted. In social life he was kind and affectionate; ever ready to assist his friends, without regard to his personal comfort. His naturally reserved manner unfitted him to occupy that position in general society which his extensive information and accurate memory amply qualified him for. He felt, too, what his position, as Her Majesty's Astronomer for Scotland, demanded, and having no facility of adapting himself to the peculiarities of others, he was content to limit his circle to a few chosen friends. Amongst these he never forgot his early patrons, towards whom he manifested to the last the same deep feelings of gratitude. By them, and by all who knew him intimately, he was much beloved, and as much respected. They will agree with me in saying that we have lost a valuable friend,—a man liberal and high-minded,—conscientious to a degree,—ready with heart and hand to assist, when assistance was called for,—with a judgment so sound, and experience so improved, as to render him a safe adviser, and an invaluable coadjutor. May the reputation he has left, and the kind remembrances which his friends cherish of him, stimulate us to follow his example, and imitate his virtues.

3. On the Chemical Relations of Creosote. By WILLIAM GREGORY, M.D., Professor of Chemistry.

The author stated, that, being struck with the singular resemblance between the properties of creosote and those of carbolic acid, as described in all chemical works, he had tried the action of a mixture of chlorate of potash and hydrochloric acid on creosote, and had thus obtained a very large proportion of chloranile, the compound yielded by carbolic acid, when treated in the same way. He had also obtained, by the action of nitric acid on creosote, evidence of the production of nitropicric acid, which is also obtained from carbolic acid.