Edinburgh journal of science.

Edinburgh.

This page intentionally left blank.

THE

Edinburgh

JOURNAL OF SCIENCE,

EXHIBITING

A VIEW OF THE PROGRESS OF DISCOVERY

IN NATURAL PHILOSOPHY, CHEMISTRY, MINERALOGY, GEOLOGY, BOTANY, ZOOLOGY, COMPARATIVE ANATOMY, PRACTICAL MECHANICS, GEOGRAPHY, NAVIGATION, STATISTICS, ANTIQUITIES, AND THE FINE AND USEFUL ARTS.

CONDUCTED BY

DAVID BREWSTER, LL.D.

F.R.S. LOND. AND EDIN. F.S.S.A. M.R.I.A.

CORRESPONDING MEMBER OF THE INSTITUTE OF FRANCE; CORRESPONDING MEMBER OF THE ROYAL PRUSSIAN ACADEMY OF SCIENCES; MEMBER OF THE ROYAL SWEDISH ACADEMY OF SCIENCES; OF THE ROYAL SOCIETY OF SCIENCES OF DENMARK; OF THE ROYAL SOCIETY OF GOTTINGEN, &C. &C.

VOL. X.

OCTOBER—APRIL.

JOHN THOMSON, EDINBURGH:

AND T. CADELL, LONDON.

M.DCCC.XXIX.

THE
EDINBURGH
JOURNAL OF SCIENCE.

ART. I.—*Biographical Account of* ALEXANDER WILSON, *M.D. late Professor of Practical Astronomy in Glasgow.* By the late PATRICK WILSON, A. M. Professor of Practical Astronomy in the University of Glasgow. *

ALEXANDER WILSON, M. D. late Professor of Practical Astronomy in Glasgow College, was a younger son of Patrick Wilson, town-clerk of St Andrews, and was born there in 1714. He was very young when his father died, and was afterwards brought up by the care of his mother, Clara Fairfoul, a person much respected for her prudence, virtue, and piety.

Having received the usual education at the different schools, he entered to the College of St Andrews, where he made great proficiency in literature and the sciences, and, after completing a regular course of studies, was admitted to the degree of Master of Arts in his nineteenth year.

Before the expiration of his academical course, his inclination led him to prefer the study of natural philosophy, and particularly those branches of it which relate to optics and astronomy. From his earliest years he discovered a strong propensity to several ingenious arts, among which may be men-

* This Memoir of Dr Wilson, after being read at the Royal Society of Edinburgh on the 2d February 1789, was withdrawn by its author, for the purpose of making some alterations upon it; and was never returned for publication. It was found, however, among the papers of Mr Patrick Wilson, and is now printed with the consent of his family. Its connection with the history of science, and of the progress of the useful arts in Scotland, gives it a very high degree of interest, and induces us to reprint it from the *Edin. Trans.* vol. x.—ED.

tioned drawing, modelling of figures, and engraving upon copperplate. Even when a boy, he often devoted his leisure to such employments, and though in all of them he was almost entirely self-directed and self-taught, yet, from time to time, he produced specimens of ingenuity which drew upon him a general attention, and which, by real judges, were considered as indications of uncommon natural talents.

Upon his leaving the college, he was put as an apprentice to a surgeon and apothecary in his native city, with a view of following that profession. At this period he became more particularly known to Dr Thomas Simson, professor of medicine in the university, who ever after treated him with much kindness and friendship. About the same time he had also the good fortune to find a patron in Dr George Martine, a physician in the town. In those days the construction and graduation of thermometers was little attended to or understood in Britain, and Dr Martine, from a just conception of the importance of this instrument in many philosophical pursuits, was then employed in composing those essays on the subject of heat which have rendered his name so justly celebrated. The author, besides illustrating so well the theory of the thermometer, was farther very desirous of bringing accurate thermometers into general use; and, with this view, he turned the attention of his friend Mr Wilson to the art of working in glass. Though this was to him entirely a new attempt, depending upon many trials, and much mechanical address, yet he very soon acquired an admirable dexterity in forming the different parts of the instrument by the lamp and blowpipe, and in constructing and graduating the scales with accuracy and elegance; an employment which, for a long time, Mr Wilson continued to be fond of at convenient seasons, and in which it is well known he greatly excelled.

Possessing naturally much activity of mind, and employing most of his leisure in some ingenious attempt or other, it was about this time that, in making certain optical experiments, he discovered the principles of the solar microscope, so far as to exhibit to several of his friends in a dark chamber the images of small objects enormously magnified, by the sun's rays entering at a hole in the window-shutter, and after several refrac-

tions falling upon a white ground within. But Mr Wilson as yet was too far separated from the great world, and had too little experience for bringing forward to the notice of the public any novelty of this kind; and soon after, a similar combination of glasses, with additional improvements, occurred to Mr Lieberkuhn, and was at length received as a very curious enlargement of the optical apparatus.

It was also, whilst employing himself in such researches, that Mr Wilson proposed to many of his philosophical friends the idea of burning at a great distance by means of plain mirrors, so situated as to throw the rays of the sun upon the same area, without the smallest knowledge of such a thing ever having been imagined by any person before him. But, wanting the means of providing himself with any costly apparatus, the matter was pursued no farther; and it is well known that M. de Buffon, some years afterwards, when equally uninformed of what Kircher had thought of, hit upon the same conception. In 1747, by a magnificent construction far beyond the reach of Mr Wilson's finances, the French philosopher showed what might be done in this way, and with such effect as to render the famous secret imputed to Archimedes, of setting on fire the Roman galleys, much less apocryphal than it had ever been considered before his time.

In 1737 Mr Wilson departed from St Andrews, and by the advice of his friends went to London, in order to seek for employment as a young person who had been bred to the medical profession. Soon after his arrival there, he engaged himself with a French refugee, a surgeon and apothecary of good character, who received him into his family, giving him the charge of his shop, and of some of his patients, with a small annual salary. About twelve months after he had been fixed in this new situation, Mr David Gregory, professor of mathematics at St Andrews, coming to London, introduced him to Dr Charles Stewart, physician to Archibald Duke of Argyle, then Lord Isla. Dr Stewart received him with great kindness, and not long after made him known to Lord Isla, who very soon was pleased to bestow upon him marks of his attention and favour. In his interviews with this nobleman, Mr Wilson had his curiosity much gratified by some valuable astronomical and

physical apparatus which his Lordship had got constructed for himself, and had placed in his library. On the other hand, Mr Wilson was happy in being able to contribute in some degree to the amusement of his patron, by constructing thermometers of different kinds for him and his friends, with more perfection and elegance than had been hitherto done at London.

Near eighteen months elapsed in this way, during which time he conciliated the good-will and esteem of his master, by a faithful and regular discharge of whatever business was committed to his care; and, in return, he found himself now and then indulged in opportunities of keeping up his connections with persons of a philosophical cast, when his attendance upon the shop or patients could be conveniently dispensed with. Mr Wilson has been often heard to speak of the satisfaction he enjoyed even at this period, and of his perfect contentment with every thing which had then fallen to his lot. But a serenity of temper, and a felicity of disposition, were qualities which eminently distinguished him throughout his whole life.

While he thus passed his time in what he considered as a comfortable settlement at his first entering upon the world, a circumstance of a very accidental nature occurred, which gave a new direction to his genius, and which in the end led him to an entire change of his profession. This was a transient visit which he happened one day to make to a letter-foundery, along with a friend who wanted to purchase some printing-types. In the course of seeing the common operations of the workmen usually shown to strangers, he was much captivated with the curious contrivances made use of in that business. Some short while afterwards, when reflecting upon what had been shown in the letter-foundery, he was led to imagine that a certain great improvement of the art might possibly be effected, and of a kind, too, that, if successfully accomplished, promised to reward the inventor with considerable emolument. His ideas upon that subject he presently imparted to a friend a little older than himself, who had also come from St Andrews, and who was possessed of a considerable share of ingenuity, constancy, and enterprise. The consequence of this was, a resolution on the part of both these young adventurers to relin-

quish, as soon as it could be done with propriety, all other pursuits, and unite their exertions in prosecuting the business of letter-founding upon an improved plan.

It was not long ere they were enabled to carry into effect this resolution, and they first established a small type-foundery at St Andrews, and one on a larger scale, two years afterwards, at Camlachie, a village near Glasgow.

In this situation, Mr Wilson had contracted habits of intimacy and friendship with several persons of the most respectable character, particularly with the Professors belonging to the University of Glasgow, and with Messrs Robert and Andrew Foulis, university printers. The growing reputation of the university press, conducted by these gentlemen, gave additional scope to Mr Wilson to exert his abilities in constructing their types, and being now left entirely to follow his own judgment and taste, his talents as an artist became every year more conspicuous. When the design was formed by the gentleman of the university, together with Messrs Foulis, to print splendid editions of the Greek classics, he, with great alacrity, undertook to execute new types upon a model highly improved. This he accomplished at an expence of time and labour which could not be recompensed by any profits arising from the sale of the types themselves. Such disinterested zeal for the honour of the university press was, however, upon this occasion so well understood, as to induce the university, in the preface to the folio Homer, to mention Mr Wilson in terms as honourable to him as they were just.

Though he thus continued to prosecute letter-founding as his chief business, yet, from his great temperance, domestic habits, and activity, he was enabled now and then to command intervals of leisure, which he never failed to fill up by some useful or ingenious employment. One of these, in which he took great delight, was the constructing of reflecting telescopes; an art which he cultivated with unwearied attention, and in the end with much success.

Among the more advanced students, who, in the years 1748 and 1749, attended the lectures on divinity in the university, was Mr Thomas Melvill, so well known by his mathematical talents, and by those fine specimens of genius which are to be

found in his posthumous papers, published in the second volume of the *Edinburgh Essays, Physical and Literary.* With this young person Mr Wilson then lived in the closest intimacy. Of several philosophical schemes which occurred to them in their social hours, Mr Wilson proposed one, which was to explore the temperature of the atmosphere in the higher regions, by raising a number of paper kites, one above another, upon the same line, with thermometers appended to those that were to be most elevated. Though they expected, in general, that kites thus connected might be raised to an unusual height, still they were somewhat uncertain how far the thing might succeed upon trial. But the thought being quite new to them, and the purpose to be gained of some importance, they began to prepare for the experiment in the spring of 1749. *

Mr Wilson's house at Camlachie was the scene of all the little bustle which now became necessary; and both Mr Melvill and he, alike dexterous in the use of their hands, found much amusement in going through the preliminary work, till at last they finished half-a-dozen large paper-kites, from four to seven feet in height, upon the strongest, and at the same time, upon the slightest construction the materials would admit of. They had also been careful, in giving orders early, for a very considerable quantity of line, to be spun of such different sizes and strength as they judged would best answer their purpose; so that one fine day, about the middle of July, when favoured by a gentle steady breeze, they brought out their whole apparatus into an adjoining field, amidst a numerous company, consisting of their friends and others, whom the rumour of this new and ingenious project had drawn from the town.

They began with raising the smallest kite, which, being exactly balanced, soon mounted steadily to its utmost limit, carrying up a line very slender, but of a strength sufficient to command it. In the meantime, the second kite was made ready. Two assistants supported it between them in a sloping direction, with its breast to the wind, and with its tail laid

* As no public notice has hitherto been taken of this matter, though Mr Wilson had always some thoughts of doing so, it is hoped the following detail will not prove unacceptable or tedious to the reader.

out evenly upon the ground behind, whilst a third person, holding part of its line tight in his hand, stood at a good distance directly in front. Things being so ordered, the extremity of the line belonging to the kite already in the air was hooked to a loop at the back of the second, which being now let go, mounted very superbly, and in a little time also took up as much line as could be supported with advantage, thereby allowing its companion to soar to an elevation proportionally higher.

Upon launching these kites according to the method which had been projected, and affording them abundance of proper line, the uppermost one ascended to an amazing height, disappearing at times among the white summer clouds, whilst all the rest, in a series, formed with it in the air below, such a lofty scale, and that too affected by such regular and conspiring motions, as at once changed a boyish pastime into a spectacle which greatly interested every beholder. The pressure of the breeze upon so many surfaces communicating with one another, was found too powerful for a single person to withstand, when contending with the undermost strong line, and it became therefore necessary to keep the mastery over the kites by other means.

This species of aërial machinery answering so well, Mr Wilson and Mr Melvill employed it several times during that and the following summer, in pursuing those atmospherical experiments for which the kites had been originally intended. To obtain the information they wanted, they contrived that thermometers properly secured, and having bushy tossels of paper tied to them, should be let fall at stated periods from some of the higher kites; which was accomplished by the gradual singeing of a match-line.

When engaged in these experiments, though now and then they communicated immediately with the clouds, yet as this happened always in fine dry weather, no symptoms whatever of an electrical nature came under their observation. The sublime analysis of the thunder-bolt, and of the electricity of the atmosphere, lay yet entirely undiscovered, and was reserved two years longer for the sagacity of the celebrated Dr Franklin. In a letter from Mr Melvill to Mr Wilson, dated at Geneva,

21st April 1753, we find among several other particulars, his curiosity highly excited by the fame of the Philadelphian experiment; and a great ardour expressed for prosecuting such researches by the advantage of their combined kites. But, in the December following, this beloved companion of Mr Wilson was removed by death,—to the vast loss of science, and to the unspeakable regret of all who knew him.

In the year 1752, Mr Wilson, who had married Jean Sharp, daughter of William Sharp, a reputable merchant at St Andrews, brought his family to Glasgow. About five years afterwards, he invented the hydrostatical glass-bubbles, for determining the strength of spirituous liquors of all kinds, which long experience, especially among the distillers and merchants in the West Indies, has now shown to be more accurate and more commodious than the instruments formerly used. From the minutes of a Philosophical and Literary Society, composed of the professors and some of their friends, whose meetings were held weekly within the college, it appears that these hydrostatical bubbles made the subject of a discourse delivered by Mr Wilson in the winter of 1757. At this time he also showed how a single glass-bubble may serve for estimating very small differences of specific gravity of fluids of the same kind, such as water taken from different springs, or the like. This he did by varying the temperature of such fluids, till the same bubble, when immersed, became stationary at every trial, and then expressing the differences of their specific gravity, by degrees of the thermometer, the value of which can be computed and stated in the usual manner.

In the year 1758 he read another discourse to the same society upon the motion of pendulums. On this occasion he exhibited a spring-clock of a small compass, which beat seconds by means of a new pendulum he had contrived, upon the principle of the balance, whose centres of oscillation and motion were very near to one another. At one of the trials it performed so well as not to vary more than a second in about forty hours, when compared with a very exact astronomical clock near to which it was placed. It was some view of rendering much more simple and cheap the machinery of ordinary move-

ments, by the slow vibrations of such a pendulum, which induced Mr Wilson to prosecute these experiments.

Not long after this, he also put in execution a remarkable improvement of the thermometer, which consists in having the capillary bore drawn very much of an elliptical form, instead of being round. By this means the thread of quicksilver upon the scale presents itself broad, and much more visible than it does in a cylindrical bore of the same capacity. The difficulty of constructing thermometers of this kind had nearly hindered him from completing his invention, as the thread of quicksilver was found extremely liable to disunite when descending suddenly in so strait a channel. But, by his long experience, joined to farther investigation and more trials, he at last discovered a method of blowing and filling thermometers with flattened bores, which freed them entirely from this defect.

About the same time, also, he conceived the design of converting a thermometer graduated for the heat of boiling-water, into a marine barometer, in consequence of the well-known difference of temperature which water, when boiling, acquires under the variable pressure of the atmosphere. This he effected, by making a boiling-water thermometer, about a foot in length, with a pretty large ball, and having a thread of quicksilver as broad and visible as was consistent with a very perceptible run upon small alterations of temperature. The stem of this thermometer he fortified, by inclosing it in a cylindrical case of white iron, having soldered to it, at its lower end, a socket of brass for receiving half of the ball, which afterwards became entirely defended, by screwing to the socket a hemispherical cap. At the other end of the case which environed the stem, there was soldered a tube of brass, wide enough to admit a scale of proper dimensions, before which there was an opening in the tube, defended by glass.

The utmost range of the scale he determined by the points, where the thermometer was found to be stationary when the ball, and a certain part of the stem were immersed in water, boiling under the greatest variations of pressure which the climate afforded. The interval so found, he subdivided by other observations into degrees, which corresponded to *inches* of the barometer, and which were so denominated upon the scale.

In the year 1756, the college of Glasgow, upon the death of Dr Alexander Macfarlane of Jamaica, a great lover of, and proficient in the sciences, received a legacy of a valuable collection of astronomical instruments, which that gentleman had got constructed at London by the best artists, and had carried out with him to Jamaica, with a view of cultivating astronomy in that island. The college, upon this, soon built an observatory for their reception, which, by medals placed under the foundation, was called by the name of their generous benefactor; and Mr Wilson was immediately thought of by the members of the faculty, as a proper person for taking charge of it, and making the astronomical observations. At this juncture his Grace Archibald Duke of Argyle, who had all along continued his patronage to Mr Wilson, more especially since he had brought the art of letter-founding into Scotland, used his influence with government, and procured his Majesty's presentation, nominating and appointing him professor of practical astronomy and observer in the College, with an annual salary of fifty pounds, payable out of the Exchequer; and, accordingly, in 1760, he was admitted to this new office by the unanimous and most cordial welcome of all the members of the faculty.

His two eldest sons, who had by this time entered upon a course of liberal education, not long after took upon them the further enlargement and improvement of the letter foundery; and, before dismissing this topic, it deserves to be mentioned, that Mr Wilson lived to such an advanced age, as to enjoy in the most feeling manner the reward of his early diligence and excellent example, in seeing the business rising in their hands to the highest reputation, not only in these kingdoms, but in foreign countries.

In 1763, when upon a visit at St Andrews, an honorary degree in medicine was conferred upon him by his Alma Mater.

Among the objects which now occupied him in the Observatory, his former labours towards improving the reflecting telescope were resumed, and pursued for a considerable length of time, with a view of obtaining some certain method of giving the parabolic figure to the great speculum. These trials

were made upon a variety of metals, comparatively of a small diameter, and focal distance; but he regarded them only as preliminary ones, and had always in contemplation to engage with apertures of much greater dimensions. He was often heard to regret, that no crowned head, or wealthy association, ever thought of patronizing an attempt to construct some vast telescope, to be employed in making discoveries in the moon or planets, or in exploring the heavens; and, it is more than probable, that if his own means had been less circumscribed, he would of himself have attempted something of this kind. The more recent labours, and brilliant success of the excellent Dr Herschel, have fully shown that such suggestions were by no means romantic; and the writer of this account, who has had the happiness of being well acquainted with both these men, has often remarked a striking resemblance in their character and turn of mind.

In 1769, Dr Wilson made that discovery concerning the solar spots, of which he has treated in the *Philosophical Transactions of London* for 1774. Not long after he entered upon this new field, the nature of the solar spots was announced by the Royal Society of Copenhagen as the subject of a prize essay. This induced him to transmit thither a paper written in the Latin language, containing an account of his observations, and of the conclusions drawn from them. In return, he obtained the honourable distinction of a gold medal of near sixteen guineas intrinsic value, having, on its reverse, the figure of Truth pendent in the air, holding a wreath in one hand, and in the other a perspective glass, and the motto, *Veritati luciferæ*.

As an astronomical observer, he was remarkable for a sharp and clear eye, devoid of all blemish, and which, too, without being liable to fatigue, had long been inured to examine and to judge of small objects in their nicest proportions; a circumstance which must have proved of great advantage to him when employing his sight upon celestial appearances by means of the telescope; and it required only to know him, to have the fullest assurance of his fidelity in rendering an account of his observations.

His discovery in regard to the solar spots, though it be gain-

ing ground more and more among those most conversant in astronomy, yet, like many other new discoveries, has not escaped its share of opposition. This gave him occasion to publish, in the *Philosophical Transactions of London* for 1783, the second paper upon that subject, after a silence of near ten years, wherein, upon the authority of many more observations made in that interval, he obviates objections, and maintains the reality of his discovery with an entire conviction. The amount of it is, " That the spots are *cavities* or *depressions* in that immensely resplendent substance which invests the body of the sun to a certain depth; that the dark nucleus of the spot is at the bottom of this excavation, which commonly extends downwards to a space equal to the semidiameter of our globe; that the shady or dusky zone which surrounds the nucleus, is nothing but the sloping sides of the excavation reaching from the sun's general surface downward to the nucleus or bottom." All this he has demonstrated by a strict induction drawn from the following phases of the spots, as they traverse the sun's disk.

When a large well-formed spot, consisting of a dark nucleus, and its surrounding umbra or dusky zone, is seen upon the middle of the sun's disk, the zone is generally equally broad all around; but when the same spot verges near to the limb, that side of the dusky zone which lies next to the centre of the disk, begins much sooner than the side diametrically opposite to turn narrower, and at last disappears, while the other still remains dilated and visible. And, in like manner, when a spot enters the disk by the sun's rotation, we see first the nucleus, and the upper and under sides of the shady zone or umbra, together with that side of it nearest to the limb, whilst the side opposite is still wholly invisible. But as the spot advances farther upon the disk, that side of its dusky zone which lately was invisible now shows itself, and continues to enlarge more and more till it becomes as broad as any other part surrounding the nucleus.

These phases, which he found so very palpable when observing carefully the great solar spot in November 1769, and so very frequent, though less obvious, in numberless other spots of a smaller size, which for several years afterwards he ex-

amined, prove in the clearest manner that the spots themselves are depressions in the luminous matter of the sun, and lead to many new and interesting ideas concerning the nature and constitution of that stupendous body.

But though he was the first astronomer to whose lot it fell to remark these phenomena of the solar spots which have been just now described, and to draw such important conclusions from them, it appears that the celebrated Mr Flamstead, so far back as the year 1676, had very nearly anticipated this discovery. For, one day when observing a spot of considerable size near the sun's limb, he actually beheld this appearance of the dusky zone which belongs to the nucleus, finding it almost wholly deficient on that side which respected the centre of the disk; and this, too, when the distance of the spot from the limb corresponded very nearly with that which Dr Wilson found to be so constant in his observations. Mr Flamstead was then, indeed, viewing his spot in peculiar circumstances, and the most favourable of all to perfect vision of the sun, as, by the intervention of a mist, he was enabled to use his telescope without the help of tinged glass put before his eye. The following is his account of this remarkable observation, in which, by the word *macula*, Mr Flamstead evidently means the nucleus of the spot, and by *nubecula* the dusky zone which surrounds it.

" 1676, Nov. 9. Deinde densi adeò vapores excepere solem, ut per ipsos licuit illum nudis oculis intueri. Adhibito tum longiore tubo absque vitro rubro, (quo oculum adversus ejus splendorem munire soleo) maculum contemplatus sum: distincta valdè videbatur, ejusque figuræ quæ in schemate adpingitur: ' Nubecula ipsi circumducta elliptica omninò; *sed, quod valdè miratus sum*, admodum dilatata à parte limbum respiciente; ab altera vero versus centrum, maculæ fere cohærere videbatur.' "

" Observavi dein maculæ a limbo proximo distantium 1′ 13″."—*Hist. Cœlest. Flamsteedii*, vol. prim. p. 363.

When Dr Wilson saw the great spot on the 23d November 1769, it had nearly the same situation upon the disk, and the same aspect as the one here described. But, at that time, like Mr Flámstead, he had no conception of what was signified by such an appearance. It was not till next day, after remark-

ing certain striking alterations of the form both of the nucleus and umbra, that the suggestion first arose in his mind of the spot being an *excavation* or *depression* on the luminous matter of the sun; which idea, the subsequent observations of the same spot most evidently confirmed.

Not long before his death, in turning over at more leisure the pages of this admirable astronomer, Dr Wilson for the first time met with the above passage, and was pleased at finding so remarkable a coincidence as to the leading fact upon which his discovery rests.

Among his papers there were found many letters he had received from Dr Maskelyne, upon whose correspondence Dr Wilson set a very high value. All his papers published in the *Philosophical Transactions of London* were communicated by that friend. Among these, we find a short one in the volume for 1774, wherein he proposes to diminish the diameter of the finest wires, used in the focus of the astronomical telescope, by flattening them according to a method there described; an idea which, though very simple, seems extremely worthy of attention.

In the month of January 1777, when conversing, as he often did in the evenings, with his son, who had now made some proficiency in the sciences, their attention was somehow turned to the following query, proposed by Sir Isaac Newton, among many others, at the end of his optics, namely, " What hinders the fixed stars from falling upon one another ?"

In reflecting upon this matter, they readily came to be of opinion, that if a similar question had been put in respect of the component parts of the solar system, it would have admitted of a very easy solution, on account of *periodical motion* appearing to them as the great mean employed by nature for counteracting the power of gravity, and for maintaining the sun and the whole retinue of planets, primary as well as secondary, and of comets, at commodious distances from one another.

In like manner, Dr Wilson thought it not unreasonable to suppose, that the same principle might have assigned to it a dominion incomparably wider in extent, and that the order and stability, even of a *universe*, and of every individual system

comprehended in it, might depend upon *periodical motion* round some grand centre of general gravitation. This conception, besides appearing to them warranted by every view they could take of the nature of gravity, seemed moreover to receive some support from the discoveries which, since the time of the great Halley, have been made of what has been called the " proper motions of the fixed stars," and particularly from the opinion entertained by that excellent astronomer, Dr Maskelyne, " that, probably, all the stars are continually changing their places by some slow and peculiar motions throughout the mundane space."

Soon after this view had arisen, out of the familiar conversation above-mentioned, it was published in a very short anonymous tract, entitled, " *Thoughts on general Gravitation, and Views thence arising as to the state of the Universe.*" The chief inducement to so early a publication was the hope of drawing immediate attention to so interesting a point, which might possibly lead to the discovery of some way by which the matter might be brought to the test of observation.

It is quite obvious, that the foregoing suggestions necessarily imply a motion of the solar system, as one of that immense host, which, for what we yet know, may be subjected to the laws of periodical revolution. Accordingly, it early occurred, that perhaps the most advantageous way of advancing in this investigation, might be to try to find out, if possible, symptoms of such a law as affecting that system to which we ourselves belong.

It sometimes struck him, when looking over the progress of philosophical discovery, that many things of high moment appear to have lain long wrapped up in embryo, by our not employing ourselves more frequently in what may be called a " *direct search,*" and in filling up with more attention and boldness the list of desiderata. Between this last step, and the accomplishment of a profound discovery, he conceived that the transition might sometimes be made with no great effort of invention, by only sifting carefully such principles as are already known and familiar to us, and availing ourselves of them in their full extent.

It was by proceeding in this way, and when considering the

manner by which the motion of light would be affected by reflecting and refracting media, themselves moving with great velocity, (a most interesting field in optics then wholly uncultivated,) that two principles came into view, either of which may possibly serve us in detecting a general motion belonging to the solar system, relatively to the surrounding fixed stars, or in proving a negative with regard to it. Of these, a very summary account has been given in the historical part of the *Edinburgh Philosophical Transactions*, vol. i. But, should they be successful in discovering such a concealed motion, the same principles cannot fail of determining the velocity and direction of it; and in process of time, whether such a translation of the whole system be in a straight line or a curve, and if in a curve, whether it be of a such a kind as may indicate a periodical revolution. And it needs scarce be mentioned, that if such a thing should actually be made out, besides enriching astronomy with that knowledge which depends upon measureable parallaxes in the sphere of the starry firmament; it would also bestow a very high authority upon Dr Wilson's suggestions, of what possibly may be the plan of nature in upholding the universe.

At the time of the last-mentioned publication, he was sixty-three years old, but still continued to enjoy the blessings of an uninterrupted state of good health. In the year 1784, at the recommendation of the university, his Majesty was graciously pleased to nominate and appoint Patrick Wilson, A. M. Dr Wilson's second son, to be assistant and successor to his father as professor of practical astronomy and observer; a circumstance which heightened the consolations he enjoyed during the evening of life.

In March and April 1786, when he had nearly completed his seventy-second year, it became apparent to his family and friends, that his constitution and strength were fast declining. After a gradual and easy decay, which lasted throughout the whole of that summer and autumn, and which he bore with the utmost composure and resignation, amidst the tender solicitudes of his surrounding family, he at last expired in their arms, on the 16th day of October.

The private character of Dr Wilson was amiable to an un-

common degree. From his early youth to venerable age, he was actuated by a rational and stedfast piety, enlivened by those gracious assurances which carry our hopes and prospects beyond the grave, and sweeten the lot of human life. The cast of his temper, though uniformly cheerful and serene, was yet meek and humble, and his affections flowed in the warmest current immediately from the heart. His looks, as well as his conversation and demeanour, constantly indicated a soul full of innocence and benignity, in harmony with itself, and aspiring to be so with all around it.

ART. II.—*On the Mean Temperature of Bombay, deduced from Observations made in* 1827, *&c.* Communicated by ALEXANDER ADIE, Esq. F. R. S. E. &c.

THE observations from which the following results are deduced were made *before sunrise*, and at 11 o'clock A. M., 1 o'clock P. M., 4 o'clock P. M. and 9 o'clock P. M.

JANUARY 1827.

	Temp. Fahr.
Before sunrise, - - -	69°07
11 o'clock A. M. - - -	76 58
1 P. M. - - -	77 56
4 P. M. - - -	78 55
9 P. M. - - -	73 00
Mean temperature for January, -	74°95
Highest, - - - -	82
Lowest, - - - -	64

FEBRUARY 1827.

Before sunrise, - - -	72°91
11 o'clock A. M. - - -	80 48
1 P. M. - - -	81 53
4 P. M. - - -	82 05
9 P. M. - - -	77 87
Mean temperature for February, -	78 97
Highest. - - - -	85
Lowest, - - - -	69½