

at night and during early morning hours, as the inventor has to give his daytime to his profession of teacher. Signor Perini informs us that he could without difficulty make his planetarium as large as the Albert Hall and small enough to become a school apparatus for teaching. He showed us a table, like a small writing-table, between the tops of which he had arranged his machinery on a small scale to give motion to a tellurium which he fits on to the table. Of course the invention, as indeed Signor Perini admits, may be capable of improvements in detail, but as it stands it seems to us a triumph of ingenuity and determined perseverance, for which its inventor deserves the highest credit.

A MICROSCOPIC SERENADE<sup>1</sup>



O COME, my love, and seek with me  
A realm by grosser eye unseen,  
Where fairer forms will welcome thee,  
And dainty creatures hail thee queen.  
In silent pools the tube I'll ply,  
Where green conferva-threads lie curled,  
And proudly bring to thy bright eye  
The trophies of the protist world.

We'll rouse the stentor from his lair,  
And gaze into the cyclops' eye;  
In chara and nitella hair  
The protoplasmic stream descrie,  
Forever weaving to and fro  
With faint molecular melody;  
And curious rotifers I'll show,  
And graceful vorticellidæ.

Where melicertæ ply their craft  
We'll watch the playful water-bear,  
And no envenomed hydra's shaft  
Shall mar our peaceful pleasure there;  
But while we whisper love's sweet tale  
We'll trace, with sympathetic art,  
Within the embryonic snail  
The growing rudimental heart.

Where rolls the volvox sphere of green,  
And plastids move in Brownian dance,—  
If, wandering 'mid that gentle scene,  
Two fond amœbæ shall perchance

<sup>1</sup> From *Scribner's Monthly Magazine* for November.

Be changed to one beneath our sight  
By process of biocrasis,  
We'll recognise, with rare delight,  
A type of our prospective bliss.

O dearer thou by far to me  
In thy sweet maidenly estate  
Than any seventy-fifth could be,  
Of aperture however great!  
Come, go with me, and we will stray  
Through realm by grosser eye unseen,  
Where protophytes shall homage pay,  
And protozoa hail thee queen.

JACOB F. HENRICI

JOHN ALLAN BROWN

IT is only a few weeks ago that it became our painful duty to record the untimely death of a distinguished mathematical and experimental physicist, and we have now to mourn the loss of one equally distinguished in observational inquiry. John Allan Brown was born at Dumfries, where his father had, we believe, a normal school especially intended for young men about to enter the navy. Upon the death of his father, Mr. Brown, then about twenty years of age, went to the University of Edinburgh, and speedily became a successful student in more than one branch of knowledge. But his strongest attachment was always to physical science, and the late James D. Forbes, who was at that time Professor of Natural Philosophy at Edinburgh, considered Mr. Brown as one of his very best pupils. A friendship was thus formed which lasted through life.

About 1842 the scientific world began to perceive the necessity of conducting cosmical inquiries, and Sir Thomas McDougal Brisbane, in the most generous manner, agreed to establish and maintain a magnetical observatory at his residence at Makerstoun. Prof. Forbes had thus the opportunity of recommending his pupil, Mr. Brown, to Sir Thomas, who gave him the directorship of his observatory. In this capacity he continued to reside at Makerstoun for some years, where the delight of pursuing an occupation congenial to his tastes was enhanced by the great pleasure he derived from the society of Sir Thomas Brisbane, and of his amiable family, and their loss one after another was a very severe trial to him. It was no slight task to superintend an institution such as this in a branch of science then comparatively new, and Mr. Brown laboured so hard at his duties that he began to have palpitation of the heart, caused, probably, by his constant night watches. In consequence of this he obtained as his assistant Mr. John Welsh, who became one of his warmest friends, and who afterwards, as Director of the Kew Observatory, won for himself a high reputation in the course of a life that was, unhappily, very short.

Mr. Brown left Makerstoun in 1850 and went to Paris, where he formed the acquaintance of the lady who was afterwards his wife, Isaline Vallouy, the daughter of a clergyman in the Canton du Vaud, and belonging to an old Protestant family of Dauphiné (du val Louise) who had fled from France at the Revolution. This lady is now left to mourn his loss. From this marriage he had three sons and two daughters. Of his sons one is an architect, one has just left this country to enter upon his duties as civil servant in the North-West Provinces of India, while another, in preparation for the Indian forest department, is finishing his studies at Nancy. In 1851, through the influence of his friend, Col. Sykes, Mr. Brown was appointed director of the Trevandrum Observatory, an institution supported by His Highness the Rajah of Travancore, and he left this country for India in the same year. Of the scientific value of his work in India we will speak later on; but we may remark that it was

attended with many difficulties. He wished amongst other things to have observations at different heights, and the great difficulties which the carrying out of this plan required have been more or less recorded in his various reports. We say more or less, for it may be questioned whether his reports, so admirable in every other respect, do full justice to himself and to those difficulties which he successfully overcame. Mr. Broun, we believe, advanced on his own responsibility the funds necessary for this experiment, but he was afterwards reimbursed. A deafness which never left him began in one of his excursions on the hills with these objects in view. He had been observing all day in the hot sun—in the evening he took a bath and got a chill from the hill breeze after it. He came back to Europe in 1866 in the hope that medical treatment might remove his deafness, returning to India for three years more.

After having finally left India he resided first in Lausanne in Switzerland, and then in Stuttgart in Germany, where his whole time was devoted to the preparation of the first volume of the results of the Trevandrum observations. This cost him an immense amount of labour without rest or recreation of any kind, except perhaps an hour or two devoted in the evening to music with his family. He was a skilled violinist, and was particularly fond of Beethoven's music. In London, where he resided for the last six years of his life, he gave his whole time and energy to the prosecution of the work he had in hand, so much so that even in taking a walk the subject would always be present to his thoughts. Two years ago his health began to give way, and he left London for the New Forest, a change which seemed for a time to be of service to his health. But again, after another year, he found that continued work was affecting his brain, and during a stay at Lynton (Devonshire) he had in 1878 a kind of nervous attack, which was the beginning of his last illness. He never altogether rallied after this attack, and was much distressed last winter at being obliged to cease from all work, but he bore this trial with much meekness and gentleness of manner to all around him.

Being rather worse in the spring, he made up his mind to go to Switzerland in search of strength, and after a few weeks of much weakness spent at Bex, he began to rally and to enjoy the walks in that beautiful neighbourhood. From there he went to Finhaut, Chamouny, and Tête Noire, and greatly enjoyed his daily excursions in the mountain paths and over the hills; indeed he used to say that they made him feel quite young again. At first after his return to London he complained of his head, but he seemed stronger again just before his death, and worked a few hours daily. He had begun an article for NATURE, and assured his family that he did not overfatigue himself. On the 22nd of last month he died suddenly. He took up the newspaper in the morning to glance at it near the fire. He had not done so for five minutes when he said, "I think I am going to faint." Medical aid was at once procured, but he had a kind of suffocation for two or three minutes, and all was over.

In reviewing the life and labours of John Allan Broun it is impossible to fence off that portion of his character which relates to science, and discuss it without reference to the other parts of his nature. To do so would be to throw away the key of the very chamber which we wish to enter.

He was a man of the most scrupulous integrity, of the most sensitive conscience. But this extreme scrupulosity did not prevent him from appearing in the most amiable character to his fellow men; for he was at the same time a man of the most delicate social instincts, and eminently qualified to shine in society; a very warm friend and a very good companion. If any one suffered from his scrupulous nature it was himself, or, to speak more properly, it was that portion of his surroundings which goes by the name of "material interests." It is of course

a mistake to suppose that the highest interests of any man can ever suffer from his being honest.

He was a devoted adherent to the Free Church of Scotland, and at a time when subscription to certain formulæ was insisted on from the professors at the Scottish Universities, his conscientious scruples stood in the way of his obtaining any appointment of this nature. Had it not been for these he might, no doubt, have had the chair of Practical Astronomy at Edinburgh, or that of Natural Philosophy at St. Andrews.

And here we may be permitted to quote a few sentences from a letter written by Prof. Forbes to Sir James Graham (then Home Secretary) urging the claims of Mr. Broun to the former of these posts. After describing the scientific qualifications requisite for an astronomer, he goes on to say:—"But beyond all these may be reckoned a conscientious zeal in the discharge of a duty, often irksome, generally solitary, without which the observatory establishment is not only useless but injurious. In these respects I can cordially recommend Mr. Broun to the favourable notice of Government from more than six years' intimate acquaintance with him. . . . He was subsequently selected by Sir Thomas Brisbane to direct the noble magnetical and astronomical observatory, erected and maintained by his liberality at his seat near Kelso. . . . You are aware how much labour and ingenuity have been expended in devising magnetic instruments and experiments. You must be aware of the skill and patience required to conduct such experiments, of a kind almost new, and with instruments whose actions and errors are almost untried. Now from frequent examination of Mr. Broun's methods, I think I am justified in saying that not one of the magnetical observatories under the direction of Her Majesty's Government has been more vigorously managed than that of Sir T. Brisbane, conducted by Mr. Broun, and probably none with more intelligence and ingenuity."

We cannot help feeling that during the latter years of his life, while he resided in London, Mr. Broun might have received a somewhat larger measure than was accorded him of generous and sympathetic treatment from those specially interested in the progress of observational inquiry. Possessed of no considerable amount of private means, he was living upon a small pension which he had from the Rajah of Travancore, and which has now expired with him. He had been led to believe that one of his labours after leaving India would be to superintend the reduction of his observations. But the publication of these reductions was discontinued after the first volume of results appeared, and, in consequence, a large mass of valuable observations made at considerable cost is now lying absolutely useless.

Surely the course of action which will establish and maintain an observatory, and then decline to make public the records is only comparable in folly with that of a man who begins to build a house which he is not able to finish.

It was a source of great sorrow to Mr. Broun that he was thus prevented from completing what he might justly consider to be the work of his life, and he then endeavoured to procure some employment by which, while advancing his favourite science, he might likewise add to his somewhat slender resources. About that time the meteorological office of this country was in process of reconstruction and he had thoughts of offering his services as one of the meteorological council. It was clear however that his deafness would be considered by those in power as a fatal disqualification for such an appointment, and in consequence he did not press his claims. It certainly seems a great pity that a national institution of this nature so liberally endowed by government should have allowed a man like John Allan Broun to die in their midst without attempting to avail themselves in some becoming and honourable manner of those large stores of

information peculiarly suited to their purpose which he alone of all men living possessed, and which he was particularly anxious to communicate to others.

About this time too, Sir E. Sabine resigned his office of magnetical superintendent, and it might naturally have been supposed that Mr. Broun was the very man to succeed him. The office was, however, discontinued. He now made application to the Government Fund of the Royal Society for a sum of money to enable him to improve and complete the reduction of the Colonial magnetic observations. But the immediate and apparent responsibility from quarter to quarter of the possessor of such grants, was peculiarly fatal to a man like Broun. The work seemed to go on growing the more he examined it, and he was never satisfied without going still more deeply into the subject than he had already gone.

Then his health began to give way, and the thought that he had received money for which he had rendered no equivalent hastened still more the progress of his malady.

At last the end came, and we can now hope no longer to complete his labours as he would have himself completed them had he been spared to us but a little longer.

It has been said of an eminent experimentalist that great as were his successes, his failures must have cost him even more thought. If this be true in experimental research, it is peculiarly true in observational inquiry where every idea in order to be tested entails a laborious investigation. Mr. Broun, whose mind was very fertile, must have often spent great labour apparently to no purpose, but on the other hand his successes were very marked, and he did not hesitate to consider a new fact as abundant compensation for a large amount of failure. We cannot attempt to give here an exhaustive catalogue of his various labours. But we may allude to the volumes embracing the results of the Makerstoun observations as pre-eminent for the skill employed in the development of new methods. These volumes alone must have cost him an immense amount of thought.

In 1861 he communicated to the Royal Society of Edinburgh, two papers of marked value. In one of these the errors and corrections of the bifilar magnetometer were discussed, including the determination of its temperature coefficient, which Mr. Broun showed might be found in a more correct method than that hitherto adopted.

The second of these papers was on the horizontal force of the earth's magnetism, for which he established the annual laws from a discussion of observations taken at various places. He likewise discovered that the variations of this element from day to day are nearly the same over all the world.

For these discoveries he was awarded the Keith Medal of the Royal Society of Edinburgh. We have already alluded to the great labour he spent upon the first volume of the "Results of the Trevandrum Observations." In this volume conclusions of the greatest scientific interest are deduced, and Mr. Broun has been able to give in a complete form the laws which regulate the solar-diurnal variation of magnetic declination near the equator. But his researches regarding the lunar-diurnal variation of this element form perhaps the most original and interesting part of the volume. He has claims to be considered as an independent discoverer of this variation, and he has certainly increased our knowledge of its laws more than any other magnetician. We may mention his observation that the lunar action was reversed at sunrise and that it was much greater during the day than during the night, whether the moon was above or below the horizon, as particularly noteworthy and likely to throw much light on the theory of the subject. We have already alluded to Mr. Broun's discovery of the similarity, all the world over, of the changes from day to day of the earth's horizontal force. Certain of these changes he found to be due to the moon, while others had a period of

twenty-six days. These last he attributed to solar action, and in discussing the subject he found that the greater magnetic disturbances were apparently due to actions proceeding from particular meridians of the sun. This is a subject of very great importance, and its exact meaning has yet to be discovered.

Mr. Broun was no less eminent as a meteorologist than as a magnetician. His observations regarding the barometer are of the greatest importance. In this branch of inquiry he has shown the apparent simultaneity of the changes of mean barometric pressure over a great part of the globe, and he has likewise discovered a period of twenty-six days. He was the first to commence those systematic observations of clouds at various altitudes that are now so extensively made, and in a paper read not long since before the Royal Society of London, of which body he was an old member, he pointed out certain relations between atmospheric motions and the directions of the lines of equal barometric pressure. For his various researches, he obtained in 1878, just one year before his death, the Royal Medal of that Society.

These are only a few of the many labours of one whose loss, so deeply felt by all his friends, may be regarded as a calamity by the cultivators of meteorology and magnetism, branches of knowledge in which he was second to none who has yet appeared.

BALFOUR STEWART

#### NOTES

DR. WARREN DE LA RUE, F.R.S., has just sent to the Chemical Society Research Fund a third donation of 100*l.*, the whole amount to be devoted to a single research.

In the person of Lady Sabine, who died at Ashley Place on the 28th ult., at the age of seventy-two years, a woman of most remarkable clearness of intellect and of power of memory has passed away. In 1827 she married Sir Edward (then Captain) Sabine, and for more than fifty years her main occupation and her chief enjoyment was to assist him in his investigations, especially in terrestrial magnetism. None but her most intimate friends can know how much of the laborious calculations in the "Contributions" were really effected by her, while she translated Humboldt's "Cosmos" and "Ansichten der Natur," besides numerous smaller papers. One of their oldest friends has truly said, "I deeply sympathise with Sir Edward; the death of his wife has rendered the number of beautiful lives in the world one less."

THE following are the probable arrangements for the Friday evening meetings before Easter, 1880, at the Royal Institution:—January 16, Prof. Dewar, F.R.S.; January 23, Dr. W. B. Carpenter, C.B., F.R.S., "Sea and Land in Relation to Geological Time;" January 30, John Marshall, F.R.S., "Proportions of the Human Figure;" February 6, William Huggins, D.C.L., F.R.S.; February 13, W. H. Preece, C.E., "Wheatstone's Telegraphic Achievements;" February 20, Rev. H. R. Haweis, "Old Violins;" February 27, Frederick J. Bramwell, F.R.S.; March 5, H. N. Moseley, F.R.S., "Deep-Sea Dredging and Life in the Deep Sea;" March 12, C. William Siemens, D.C.L., F.R.S.; March 19, Prof. Tyndall, D.C.L., F.R.S. The following are the lecture arrangements before Easter:—Christmas Lectures (adapted to a juvenile auditory): Prof. Tyndall, D.C.L., F.R.S., six lectures on "Water and Air," on December 27 (Saturday), 30, 1879, January 1, 3, 6, 8, 1880; Prof. Edward A. Schäfer, F.R.S., ten lectures on "The Physiology of Muscle," on Tuesdays, January 13 to March 16; H. Heathcote Statham, two lectures on "Modern Architecture since the Renaissance," on Thursdays, January 15 and 22; Prof. Dewar, F.R.S., eight lectures on "Recent Chemical Progress," on Thursdays, January 29 to March 18; Prof. T. Rupert Jones,