

before the ninth century A.D., and that, if a single inscription prove untrustworthy, we shall have to fix the tenth century as the earliest date attested. Another point on which there can be no doubt that he is right is that the Arabic epithet *hindashi*, applied to the decimal notation, certainly does not mean Indian, the word for which is *hindī*, and cannot be connected with *hindashi* by any regular Arabic method of word-formation; not to mention that *hindashi* usually means "geometrical," and was derived from a Persian word by the Arabic lexicographers themselves. There is no probability in favour of Colebrooke's conjecture that the Indian work translated by Alfarazi was entitled "Siddh'anta"; and it is clear enough that after Brahmagupta there was a decline in the study of mathematics in India.

As to Brahmagupta himself, Mr. Kaye points out that in his treatise, side by side with Hero's exact formula for the area of a triangle in terms of the sides, he gives the absurd rule that the product of half the base and half the sum of the other sides is the gross area of a triangle—a survival of a rough approximation similar to those used in Egypt more than two thousand years previously—and this without a word of warning as to when this method would give no approximation at all (though, of course, it should be remembered that in applying this rule, the side most unequal to the others would probably be taken as the "base"). Altogether Mr. Kaye's paper is well worth reading, although he refrains from advancing any definite conclusions of a positive character.

G. B. M.

PROF. J. B. PETTIGREW, F.R.S.

BY the death of Prof. Pettigrew another gap has occurred in the able band who, in the last three or four years of the "fifties" of last century, studied at Edinburgh University. Born in 1834 at Boxhill, in Lanarkshire, young Pettigrew attended first Airdrie Academy and then arts' and a few divinity classes in Glasgow University. Proceeding to the University of Edinburgh as a medical student in 1856, he was first brought into notice in the senior anatomy class of Prof. Goodsir, for by devoting himself to a research on the arrangement of the muscular fibres of the heart he, with 125 marvellous dissections and 120 ingenious drawings, carried off the gold medal. By and by he became president of the Royal Medical Society in Edinburgh, and gave the "Croonian" lecture on the arrangement of the muscular fibres of the heart (after rehearsing it to his fellows in Edinburgh) to the Royal Society of London. He also won the gold medal in the class of medical jurisprudence for an essay on the presumption of survivorship. Next he carried on a research on the cardiac nerves and their connections with the cerebro-spinal and sympathetic system, for which a gold medal was awarded on graduation day, 1861.

After a brief period of office as house-surgeon in Prof. Syme's wards in Edinburgh Infirmary, Pettigrew was appointed assistant curator (under Prof. Flower) in the museum of the Royal College of Surgeons, London. There his remarkable skill in dissection, his stimulating enthusiasm, and his fine preparations of the muscular coats of the stomach, bladder, and other viscera—which he rendered so visible by distending them with coloured plaster of Paris—made his period of office memorable. He also published at this time his memoirs on the arrangement of the muscular fibres of the heart and on the muscular fibres of the stomach and bladder in the *Philosophical Transactions*; and another memoir on the relations, structure, and functions of the valves

of the vascular system in vertebrates (*Trans. Roy. Soc. Edin.*). He further entered into another field, viz. the mechanism of flight, first prominently brought out in his lecture on the subject at the Royal Institution. This was followed by his elaborate and finely illustrated memoir in the *Linnean Transactions*, and, in 1879, by his volume on animal locomotion in the *International Series*.

His health, however, broke down in 1868, and as total blindness was feared he had to relinquish his post at the museum of the Royal College of Surgeons in London and take rest. Improving in health, he, in 1869, accepted the post of curator of the museum of the Royal College of Surgeons in Edinburgh. He held also the offices of pathologist to the Royal Infirmary, lecturer on physiology to the Royal College of Surgeons in Edinburgh, &c. He published in 1874 a volume on the physiology of the circulation in plants, in the lower animals, and in man. Unsuccessfully competing for the chairs of anatomy and physiology in Edinburgh University, his niche was found in the professorship of medicine and anatomy (Chandos chair) at the University of St. Andrews in 1875. His period of office in this chair soon became eventful, as he was appointed the university's representative on the General Medical Council, and in connection with the union of the university with Dundee College. To his labours, and those of one or two others, the university owes the Berry fund of 100,000*l.*, the principal's residence of Scores Park, and the fine Bute Medical Buildings.

In recent years he published various general papers, gave the "Harveian" oration in Edinburgh in 1889, and continued his researches on the mechanism of flight in his private laboratory, where his remarkable machine with its gigantic wings exhibited all his recent experiences. Failing health lately much curtailed his labours, yet, under great weakness, he bravely elaborated a large illustrated work embodying the various researches formerly alluded to and evidences of design in animals. Besides other honours, he received the Godard prize of the French Academy of Sciences, and was made a laureate of the Institute of France.

W. C. M.

W. A. SHENSTONE, F.R.S.

"DISTINGUISHED for his skill as an experimenter, for his ability as a teacher, and for his zeal in the introduction of improved methods of teaching physical science as a branch of general education." Such was the statement of his qualifications for admission to the Royal Society, of which Shenstone became a Fellow in 1898. By his friends he will be remembered for his enthusiastic eagerness in the pursuit of science, by unselfish devotion to what he thought his duty, by his loyalty and good-fellowship, and by the indomitable cheerfulness with which he bore physical suffering.

I made his acquaintance in October, 1871, when, as one of the Bell scholars, Shenstone entered the laboratory of the Pharmaceutical Society in Bloomsbury Square, where I was then demonstrator. After my removal to Clifton College, and feeling the need of an assistant, I was led to think of the young student I had left behind. He accepted the proposal to live under my roof, and thus was laid the foundation of a friendship which persisted without a check to the end. In 1875 Shenstone left me on his appointment as science master at Taunton College, and after about two years removed to Exeter School to take up a similar appointment. Here he built and fitted up a school laboratory, which he described in *NATURE* (July 25, 1878), and which proved that, con-

trary to general belief, a place for teaching physical science practically was not necessarily a very costly affair. Shenstone while with me assisted in various lines of experimental research, and after leaving was good enough to return and devote a whole month of the summer holidays to work in the laboratory. In those days no science master who had ambition to be more than a teaching machine could refresh his own mind or take part in the advancement of his subject save at the sacrifice of recreation, health, and pocket; and the pity of it is that times are not greatly altered in this respect.

In 1880 Shenstone was appointed chief science master at Clifton, and, spite of heavy routine, he managed to carry out admirable and difficult work on ozone, and on the properties of certain highly purified substances, from which he drew the important conclusion that in certain cases two elements can unite together without the presence of that minute quantity of a third substance which had been supposed by some chemists to be invariably necessary.

Shenstone was a skilful glass-blower and an excellent popular lecturer. He was instrumental in introducing vitrified silica as a material for making tubes, flasks and other vessels for laboratory use which are now manufactured in a clear form by Messrs. Johnson and Matthey. The production of this material was described by Shenstone in a lecture at the Royal Institution in 1901.

He died on February 3, after a long illness, at Mullion, South Cornwall, aged fifty-eight; and there he lies in the old churchyard within sight of the Cornish sea, which he so much loved.

Shenstone married in 1883 Mildred, daughter of the late Rev. R. N. Durrant, of Wootton, Canterbury, who survives him, together with a son and daughter.

WILLIAM A. TILDEN.

NOTES.

At the annual general meeting of the Royal Astronomical Society to be held to-morrow (Friday) the president will deliver an address on presenting the gold medal of the society to Sir David Gill, K.C.B., F.R.S., to whom it has been awarded for his contributions to the astronomy of the southern hemisphere and his other astronomical work.

THE Dublin meeting of the British Association will be held on September 2-9 under the presidency of Mr. Francis Darwin, F.R.S. The sectional presidents are as follows:—A, Dr. W. N. Shaw, F.R.S.; B, Prof. F. S. Kipping, F.R.S.; C, Prof. J. Joly, F.R.S.; D, Dr. S. F. Harmer, F.R.S.; E, Major E. H. Hills, C.M.G.; F, Lord Brassey, K.C.B.; G, Mr. Dugald Clerk; H, Prof. W. Ridgeway; I, Dr. J. S. Haldane; K, Dr. F. F. Blackman, F.R.S.; L, Prof. L. C. Miall, F.R.S. There will also be a subsection of Section F, to be concerned with agriculture, and the chairman will be Sir Horace Plunkett, K.C.V.O., F.R.S. The first evening discourse will be delivered by Prof. H. H. Turner, F.R.S., on "Halley's Comet," and the second by Prof. W. M. Davis, of Harvard University, on "The Lessons of the Colorado Cañon."

THE death is announced, at the age of eighty-seven, of the Rev. F. Howlett, whose drawings and observations of sun-spots have appeared in various publications, and will be remembered by many students of solar physics.

THE thirty-fifth annual dinner of old students of the Royal School of Mines will be held on Wednesday, March 18, at the Hotel Cecil. The chair will be taken by Dr. R. Pearce.

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THE Mary Kingsley medal, which was struck by the Liverpool School of Tropical Medicine for presentation to distinguished investigators and others who have aided the cause of combating disease in the tropics, has been presented to Lord Lister, who formally opened the school on April 21, 1899. The medal was forwarded to Lord Lister with a letter signed by Princess Christian (hon. president), Sir Alfred Jones (chairman), Sir Rubert Boyce (dean), and Mr. Alan Milne (secretary), in which it was stated:—"No words of ours are required to amplify the esteem in which your magnificent achievements are held throughout the world. The Mary Kingsley memorial medal has been founded for the purpose of recognising the work of those who have accomplished much in the cause of tropical medicine. No one has accomplished more for this cause, or, indeed, for the whole cause of medicine, than yourself. The school feel honoured that your lordship has consented to receive the medal."

WE regret to learn from the *City Press* that Mr. R. J. Friswell, whose name is well known among analytical chemists, died on February 6 after a brief illness. Mr. Friswell studied at the Royal College of Chemistry under Sir Edward Frankland, and later acted as assistant at St. Mary's Hospital to Dr. W. J. Russell. Subsequently he engaged in research work at the Royal College, being appointed in that connection on the staff of the Indian Eclipse Expedition, and later, on his return to London, continuing to assist Sir Norman Lockyer in his spectroscopic researches. Afterwards, for many years, he was the chief chemist to the firm of Brooke, Simpson, and Spiller, leaving them to become the scientific adviser of the British Uralite Company, Ltd. For the last few years he had been in practice for himself as an analytical chemist in Great Tower Street. Mr. Friswell was elected a Fellow of the Chemical Society in 1871, and served on the council for several years; he was one of the founders of the Institute of Chemistry, and last year was chairman of the London section of the Society of Chemical Industry.

WE notice with regret the announcement that Sir J. D. Macdonald, K.C.B., F.R.S., retired Inspector-General of Hospitals and Fleets, died at Southall on February 7 in his eighty-first year. Sir J. D. Macdonald entered the Royal Navy as an assistant surgeon in 1849, and was placed in charge of the Plymouth Hospital Museum. In 1852 he joined H.M.S. *Herald*, and from that date until July, 1859, when promoted to surgeon, he was employed on surveying and exploring service in the south-west Pacific. After many years of almost unremitting microscopic work on the products of the sounding-lead, dredge, and towing-net, he was elected a Fellow of the Royal Society. His next promotion came in 1866, and for nine years he held the post of professor of naval hygiene at the Netley Medical School. In the meantime he was awarded the Macdougall-Brisbane medal of the Royal Society of Edinburgh in 1862, and the Gilbert Blanc medal in 1871. He was the author of numerous papers read before the Royal Societies of London and Edinburgh and other societies. His published works also included "A Guide to the Microscopical Examination of Drinking Water," "Analogy of Sound and Colour," and "Outlines of Naval Hygiene." He was made a Deputy-Inspector-General of Hospitals and Fleets in February, 1875, and five years later was again promoted, holding from 1883 to 1886, when he retired from active service, the charge of the Naval Hospital at Stonehouse. In 1902 he was made a K.C.B.

THE February number of the *Strand Magazine* contains two articles of interest to readers of NATURE. In the one,