entangling microscopic food particles brought in with the water current. But this theory can in no way be correlated with the facts: (1) that the main work of food collection is done not in the pre-pharyngeal zone but in the pharynx itself, (2) that the endostyle is the main mucus secreting organ and supplies the peri-pharyngeal zone with the necessary mucus, and (3) that cells containing dark granules are secreted into the cavity of the neural gland and are discharged therefrom into the branchial cavity. The structure of the neural gland in *Herdmania*, the fact that the secretion of the gland originates by the disintegration of cells proliferated from the endothelium of its walls and the presence of dark granules in the excreted cells, strongly indicate that the gland subserves an excretory function. The opening of this gland at the base of the sensory dorsal tubercle is, however, a problematical association. But, as Herdman[5] pointed out, this connection between the duct of a gland and a pre-pharyngeal sense organ may be a secondary and purely accidental relationship.

The relative position of the neural gland, nerve-ganglion and dorsal tubercle is also of phylogenetic importance. The dorsally situated neural gland of *Herdmania*, which belongs to the Cynthiidæ, has thus far been found in only one other family of ascidians —the Botryllidæ. But Botryllidæ are compound ascidians and as such can have no direct relation with the Cynthiidæ, which are simple ascidians, according to Herdman's system of Tunicate classification[6] followed in most text-books of Zoology. On the other hand, the similarity in the dorsally situated neural gland points to a common origin of the Cynthiidæ and the Botryllidæ. A number of other examples from Herdman's system of classification show an unnatural separation of forms admittedly allied. *Clavellina* and *Diazona* are more similar in structure to *Ciona* than to *Coelocormus* or *Perophora*.[7] These affinities can be proved embryologically also. It is certain, therefore, that the compound ascidians are not a closely knit group of ascidians obtained from one common stock, but that they have evolved separately from different simple ascidian stocks to which they are more closely related than to other compound ascidians.

The author wishes to express his thanks to Dr. Sundara Raj of the Madras Fisheries Department for placing the resources of the Tuticorin Fisheries Station at his disposal for the collection of material. To Professor K. N. Bahl he is very much indebted for taking keen interest in the progress of the work and for valuable criticism.

[5] *Proc. Roy. Soc. Edin.*, 1883, **12.**

[6] *Journ. Linn. Soc. Zool.*, 1891, **23.**

[7] Garstang, *Rep. Brit. Assoc.*, 1895, 718-19.

Obituary.

Shiv Ram Kashyap (1882-1934).

RAI BAHADUR DR. S. R. KASHYAP, B.A. (Cantab.), D.Sc. (*Honoris Causa*, Panjab), I.E.S., F.A.S.B., Professor of Botany, Government College, Lahore, and of the Panjab University and Honorary Professor of Botany, Hindu University, Benares, died suddenly at Lahore, on the 26th November, 1934, of heart-failure. Even half an hour before his death, he was attending to his work with his characteristic thoroughness.

To-day his country is the poorer by the loss of one of its best-known and best-beloved intellectuals. As a scientist, he was respected all the world over and as a teacher he will be mourned by a host of admiring students all over the country, many of whom are holding University Chairs in Botany and other important appointments. For ever, he will be looked upon as one of the chief makers of modern Indian Botany. His pioneer researches on Himalayan Liverworts will go down to posterity as a great scientific achievement which will keep alive his memory for ever.

In his early life, Kashyap had a brilliant and remarkable academic career which can seldom be rivalled. Born on 6th November 1882 at Jhelum of a family with a long record of meritorious military services, he matriculated from the Panjab University in 1899. In 1900, he joined the Medical School at Agra and received his Medical Diploma in 1904, topping the list of successful candidates and winning the First Medal. He then served for two years in the Medical Service of the United Provinces.

While still a student of the Medical School he appeared as a private candidate for the Intermediate science examination

of the Panjab University and not only succeeded in passing the examination in the first division but stood at the top of the list in the University. He was offered a university scholarship but this he declined to accept and went on with his studies at the Medical School. In 1906, while serving in the Medical Department of the United Provinces, he again appeared as a private candidate for the B.Sc. examination of the Panjab University and again topped the list of successful candidates. In the same year he resigned his post in the Medical Service and was appointed Assistant Professor of Biology at Government College, Lahore. In 1909, he passed the M.Sc. examination in Botany, again getting a very high first class and standing first among the M.A. and M.Sc. candidates in the University. As a result he was awarded the much-prized Arnold and Maclagan Gold Medals of the University.

In 1910, he went to Europe and joined the Cambridge University from where, in 1912 he took his Honours Degree in the Natural Science Tripos.

On his return home, Professor Kashyap was appointed Professor of Botany at the Government College, Lahore, in the senior grade of the Provincial Educational Service and was promoted to the Indian Educational Service in 1920. In 1919, when the Honours School in Botany was organised by the Panjab University, he was appointed University Professor of Botany, in which capacity he continued to serve the cause of education until his death.

He had been an elected Fellow of the University for many years and the Dean of the Science Faculty for a long time. He was also a member of the Syndicate and in 1931 officiated as Dean of University Instruction for some months. He had been for several years a member of the Science Faculty and of the Boards of Studies of several other Universities also, such as Agra, Lucknow and Benares. Professor Kashyap was the first systematic botanist to preside over the annual deliberations of the Indian Science Congress in 1932, ever since it was founded in the year 1914. It was the highest honour that the Indian scientists could confer on him. In recognition of his valuable contributions, the Panjab University, in 1933, conferred on him, *Honoris Causa*, the Degree of Doctor of Science.

He was the first secretary of the Indian Botanical Society, which was founded in 1920, and did all the spade work in its organisation. He was its President in 1925 and was the Editor-in-Chief of its organ, the *Journal of the Indian Botanical Society*. He was also an Advisory Editor of *Chronica Botanica*, published from Holland. He was elected President of the Botany Section of the Indian Science Congress in 1919 when the Congress met at Bombay.

Dr. Shiv Ram Kashyap

He contributed numerous papers on various groups of the Vegetable Kingdom. His contributions to three subjects—the sexual generation of Equisetum, the Liverworts of the Western Himalayas and the flora of Tibet—however, stand out above all others. One of his very first papers appeared in 1919, in which he described the structure and development of the sexual generation of *Equisetum debile*, one of the Indian members of the family of horsetails, growing at Lahore, which was quite different from what was known up to that time in many species worked out by European and American investigators. The account was so different that some people even made adverse remarks in the beginning but later they all agreed when they saw the specimens. In 1917, Prof. Kashyap suggested that the sexual generation of other species would also show a similar structure as seen in the Indian species if certain conditions with regard to space and nourishment were fulfilled. Later work has shown how prophetic his prediction was.

The second subject of Prof. Kashyap's investigations has been the little group of

Liverworts or *Hepaticæ*. His contribution to the knowledge of the West-Himalayan Liverworts has been very great and this may be regarded as his chief subject. He described 4 new genera and over 30 new species of Liverworts. When his first paper on them was published Professor Goebel, of Munich University, one of the leading botanists of the World, wrote to him: "You have struck a gold vein in the Western Himalayas and made a most valuable addition to our knowledge of Liverworts" Professor (now Sir John) Farmer wrote, "I cannot refrain from congratulating you on the advance towards our knowledge of these interesting plants which you have been able to make."

His contribution to the Theory of Evolution by Reduction, in this group is very important and has been highly appreciated in Europe and America. He not only greatly expanded this theory and placed it on a strong basis but actually followed out the various lines of evolution. Dr. Cavers wrote to him, "I shall have to re-write the portion of 'Inter-relationships' dealing with the Marchantiales." Recently he published a monograph on the Liverworts of the Western Himalayas and the Panjab Plain. This is a very valuable piece of work and fills a great gap in the botanical literature of India.

The third subject to which Prof. Kashyap very largely contributed is the Flora of the Western Himalayas and Western and Central Tibet. He was a great traveller and probably knew more than anybody else about this interesting country. He crossed the Himalayas into Tibet at nine different places throughout its length and several times at some places. Among the regions visited by him are Ladak, the sources of practically all the rivers of the Panjab, the world-famous sacred country of Mountain Kailas and Lake Manasarovar, the sources of the Ganges and the Jumna, the country in the neighbourhood of Kanchenjunga, Gyantse, etc., etc. It may be said of him that he knew the Himalayas as one knows his own home. He brought back a very large collection of plants from these places, many of which have not been recorded from that country so far. Besides adding to the botany of these regions, he even extended their geographical knowledge. The exploration of the Himalayas and the study of its vegetation were his life's passion. It may not be known to all that years back when far out on the other side of the Himalayas, he fell ill and had to be brought down almost in an unconscious state. But that could not keep him back from further explorations in the following years. Last year, when up on the Himalayas, he again became seriously ill and had a bad attack of heart trouble. This year, he slightly recovered from its effects and was planning yet another trip to the Himalayas. With him, his work came first and if any one remonstrated with him for working so hard in his failing health, he would say "Why, my life is not more important than my work." Such was his love for his work. Those of us who had the rare good fortune of working with him as colleagues for a number of years look upon his death as a personal loss. A distinguished scientist, a pioneer botanist, a great teacher, and an indefatigable worker, an untiring Himalayan explorer, yes, he was all that but much more—he was, on top of everything else, a sincere friend and a generous helper to all his colleagues and pupils. Richly endowed with qualities of head, he achieved his tremendous popularity even more by his unique qualities of heart. He possessed in an extraordinary degree that sweet reasonableness which stamped him out at once as a gentleman and a man of true culture. All those who like me came in close personal contact with him, at once felt the subtle charm and magnetism and human warmth of his presence.

Such was the man who is deeply mourned to-day by a very wide circle of grief-stricken friends and admirers.

H. CHAUDHURI.

The following is a list of the publications of Professor Kashyap:—

(1) Notes on species of *Euglena* (*Records of the Indian Museum*, Calcutta, April 1908). (2) Structure and development of the Prothallus of *Equisetum debile* (*Annals of Botany*, London, January 1914). (3) Notes on New and Little-known West Himalayan Liverworts. No. 1 (*New Phytologist*, Cambridge, 1914). (4) Notes on New and Little-known West Himalayan Liverworts, No. 2 (*New Phytologist*, Cambridge, 1914). (5) Notes on New and Little-known West Himalayan Liverworts, No. 3 (*New Phytologist*, Cambridge, 1915). (6) The genus *Riccia* and the origin of the Pteridophytes (*Lahore Phil. Soc.*, June 1915) (*Proc.* for 1915-16). (7) Notes on *Targionia hypophylla*, (*New Phytologist*, Cambridge, 1917). (8) Notes on *Equisetum debille* (*Annals of Botany*, London, 1917). (9) Liverworts of the Western Himalayas and the Panjab Plain, No. 1 (*Jour. Bomb. Natur. Hist. Soc.*, 1916). (10) Liverworts of the Western Himalayas and the Panjab, No. 2 (*Jour. Bomb. Natur. Hist. Soc.*, 1917). (11) Notes on the inflorescence of *Zea Mays* (*Lahore Phil. Soc.*, June 1918) (*Proc.* for 1917-20). (12) Abnormal number

of needles in the shoots of *Pinus longifolia* (*Jour. Ind. Bot.*, 1919). (13) Presidential Address to the Botany Section of the Indian Science Congress at Bombay in Jan. 1919 (*Proc. As. Soc. Beng.*, New Series, Vol. 15, 1919, No. 4, The relationships of Liverworts, especially in the light of some recently discovered Himalayan Forms). (14) The Andrœcium of *Plagiochasma appendiculatum* L. and *P. articulatum* Kash. (*New Phytologist*, 1919). (15) Variability in some Himalayan Liverworts (*Lahore Phil. Soc.*, February 1917) (*Proc.* for 1917-20). (16) Distribution of Liverworts in the Western Himalayas (*Lahore Phil. Soc.*, November 1919) (*Proc.* for 1917-20). (17) Floating Islands of Riwalsar (*Jour. Ind. Bot.*, April 1920). (18) Notes on the distribution of Liverworts in the Western Himalayas, Ladak and Kashmir (*Jour. Ind. Bot.*, May 1921). (19) Some observations on *Cycas revoluta* and *C. circinalis* growing in Lahore (*Jour. Ind. Bot.*, June 1921). (20) Notes on some Foreign Plants which have recently established themselves about Lahore (*Jour. Ind. Bot.*, December 1932). (21) A contribution to the Life-history of *Anœura indica* St. (*Jour. Ind. Bot.*, December 1922, jointly with S. K. Pande). (22) A long-lost Liverwort (*Monoselenium tenerum*), (*Jour. Ind. Bot. Soc.*, 1923). (23) Two Indian species of the genus *Notothylas* (*Lahore Phil. Soc.*, November 1923, Vol. 4). (24) Some abnormalities in the flowers of *Cannabis sativa* (*Jour. Ind. Bot. Soc.*, 1925, Vol. 4, No. 6). (25) Abnormal sporophylls in the male cone of *Cycas circinalis* (*Jour. Ind. Bot. Soc.*, Vol. 4, Nos. 9 and 10). (26) The Vegetation of Western Himalayas and Western Tibet in relation to their climate (*Jour. Ind. Bot. Soc.*, Vol. 4, Nos. 9 and 10, 1925). (27) The colour in the flowers of *Potentilla argyrophylla* (*Abs. Ind. Sci. Cong.*, 1926). (28) *Salsola fœtida* with special reference to its galls (*Proc. Lahore Phil. Soc.*, Vol. 5, 1925-26). (29) Replacement of fertile shoots by vegetative shoots in *Euphorbia tibetica* Boiss. (30) A new species of *Petalophyllum P. indicum*, Kashyap, from Lahore (*Jour. Ind. Bot. Soc.*, 1928, Vol. 7, No. 1). (31) A study of *Dumortiera* (jointly with Mr. Brij Lal Sethi) (*Abs. Ind. Sci. Cong.*, Madras, 1929; Botany Section *As. Soc. Beng.*). (32) Observations on the flora of the Upper Chandra Valley and Spiti (*Abs. Ind. Sci. Cong.*, Madras, 1929, *As. Soc. Beng.*). (33) Some geographical observations in Western Tibet (*Jour. and Proc. As. Soc. Beng.*, 1929, Vol. 25, No. 1). (34) Liverworts of the Western Himalayas and the Panjab Plain, Part I (Panjab University Publication, 1929). (35) Liverworts of the Western Himalayas and the Panjab Plain, Part I, Supplement (Panjab University Publication, 1933). (36) Liverworts of the Western Himalayas and the Panjab Plain, Part II (Panjab University Publication, 1933). (37) The Liverwort flora of Sikkim. Read at the Ind. Sci. Cong., Allahabad, January 1930 (*As. Soc. Beng.*, Bot. Section). (38) Notes on the flora of Central Tibet, Read at the Ind. Sci. Cong., Allahabad, January 1930 (*Abs. Bot. Sec., As. Soc. Beng.*). (39) Some abnormal cones in *Equisetum debille* (*Jour. Ind. Bot. Soc.*, Vol. 9, No. 4). (40) Some peculiar cones and microsporophylls of *Cycas circinalis* (*Jour. Ind. Bot. Soc.*, Vol. IX, No. 4). (41) *Stellera chamæjasme* Linn. (*Jour. Ind. Bot. Soc.*, 1930, Vol. IX, No. 4). (42) Acrogynous Liverworts of the Western Himalayas (*Malaviya Commemoration Vol.*, 1932). (43) Some aspects of the Alpine vegetation of the Himalaya and Tibet with appendix—List of plants in the Herbarium of the Botany Department, Government College, Lahore, collected by Prof. S. R. Kashyap beyond the main Himalayan range, Pres. Address to the Nineteenth Indian Science Congress at Bangalore (*Proc. of the 19th Ind. Sci. Cong.*, 1932). (44) Autonomous movement in the leaves of *Curculigo recurvata*, Dryand. (*Current Science*, Vol. I, No. 1). (45) Some more peculiarities in the male cone of *Cycas circinalis* collected at Lahore in 1932 (*Ind. Sci. Cong.*, Patna, 1933, Abs.) (46) An account of a Journey to the Gangotri Glacier (*Urusvati Journal*, 1933). (47) Jointly with P. N. Mehra. Dichotomous branching in the leaves of *Pleopeltis simplex* Sw. (*Current Science*, 1934, Vol. III, No. 2). (48) Flora of the Central Panjab (To be published shortly by the Panjab University).

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Dr. Ekendranath Ghosh, M.Sc., M.D.

WE regret to announce the untimely death of Dr. Ekendranath Ghosh, M.Sc., M.D., Professor of Biology, Medical College, Calcutta, at the age of 50, on the 15th of October, at his Calcutta residence. Dr. Ghosh was a distinguished graduate of the Calcutta University and was appointed as the Professor of Biology in 1917. He was not only a distinguished Biologist and Physician, but was vastly read in Sanskrit Ayurveda and Hindu Astronomy and published valuable contributions in all these subjects. One of his important papers that appeared four days before his death is reviewed in another place in this issue. His death is mourned by a large circle of his friends and pupils.