mediately above and below. A curious result is that the intercellular spaces become themselves tetrakaidecahedral enclosures, bounded by the arms of eight surrounding cells.

The smaller cells of stratified epithelium were modeled to a limited extent. They also are primarily tetrakaidecahedral, and sustain the conclusion that this is the typical form whenever cells occur in masses.

What further studies are suggested by these observations? Since the modeling of vegetable cells is relatively easy, an extension of this research to other tissues of plants is entirely practicable and promises interesting results. But instead of undertaking this at present in the Harvard laboratory, we are considering the eight-surfaced cells of the simple epithelium of animals. When this epithelium is spread in a flat sheet, its cells are commonly hexagonal prisms with flat or more or less rounded ends. But when such an epithelium forms the wall of a cylindrical tube or duct, its cells necessarily become compressed at their inner ends and somewhat expanded basally—more so when they line a spherical alveolus. Professor Graustein is calculating the changes in surface area that accompany these three arrangements, and this is apparently a new problem. The appearance of the cells in sections suggests that surface tension may cause the narrowed ends to tend to withdraw from the lumen, leading to the production of basal or parietal cells; and it may be that the terminal bars or "Schlussleisten" serve to counteract this effect by holding the narrow ends in position.

The problem of the endothelial cell also is seen in a new light, if attention is given to the shape of the cells. They are remarkable departures from the spherical form which free cells tend to assume, and the cause of their flattening has not yet been determined. If a capillary wall consists of active protoplasmic cells flattened because of tension, it is quite possible that the capillaries possess a tireless contractile force apart from any Rouget's or muscle cells. This also is under investigation; and the two problems here outlined may suggest still other applications of the conclusion that cells in masses are typically tetrakaidecahedral.

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WILLIAM OTIS CROSBY

IN the early dawn of December thirty-first, as the year 1925 drew to its end, the spirit of William Otis Crosby returned to Him who gave it. Thus ended a life spanning three quarters of a century and a geological career of more than fifty years.

It was in the little village of Decatur, Ohio, that Crosby was born on the fourteenth of January, 1850. He came of all-English stock, and his ancestors settled in eastern Massachusetts shortly after the landing of the Pilgrims. From Ohio Crosby's parents moved to Toledo, Iowa, when the child was five years old. Later came the Civil War, and a boy of eleven watched his father march away to defend the Union, leaving heavy responsibilities upon very small shoulders; for three younger children now looked to him for help the father could no longer give.

Peace restored, the father became superintendent of a gold mine in North Carolina and soon brought his family to the new field of labor. Here in the Carolina hills the eyes of young Crosby opened to the wonders of nature, and he began to read such books on geology as he could secure. A clerkship in the Pension Bureau at Washington took the boy for two years into a less romantic atmosphere; but the evenings were his own, and geological literature was here more accessible. It is not surprising, therefore, that when in the early spring of 1871 young Crosby journeyed westward with his father, it was with a mind keenly alert to the geological features passed on the way. A carefully kept journal records not only his interest in the herds of wild buffalo seen on the plains and his enthusiasm for the vision of snow-clad Rockies looming on the western horizon, but likewise a host of geological observations which show that the youth of twenty-one had also scientifically "come of age."

During the summer Crosby twice ascended Gray's Peak, the last time in company with a party from the Massachusetts Institute of Technology, which included President Runkle, four professors and twenty students. Before the party left Crosby had made up his mind to enter the institute that same fall. Leaving the assay office in Georgetown where he had found employment, he journeyed eastward in November, quickly made up lost work and carried through his program of studies, although not without an interruption of one year spent with his father in a silver mill near Georgetown. It was to the Colorado home also that he returned for most of the summers during his years as an undergraduate at the institute. But the summer of 1873 found him a student of the great Agassiz in the summer school at Penikese, an experience which made a deep impression upon the maturing young scientist.

On his graduation from the institute in 1876, Crosby obtained a position as assistant in geology and mineralogy in the Boston Society of Natural History, where he served under the distinguished paleontologist, Alpheus Hyatt. At the same time he was made assistant in geology at the Massachusetts Institute of Technology, where he became instructor two years later, soon rising to professorial rank, which position he held until 1907, when increasing deafness caused

his retirement. From 1878 until his death, his home was in Jamaica Plain, one of the suburbs of Boston.

Professor Crosby's career as a geologist is remarkable not only for his productivity, apparent from the list of his published books and articles, numbering more than one hundred titles in addition to more than two hundred brief reviews and abstracts, but also for the diversity of geological phenomena which claimed his attention. Every page of nature's book which opened before him held something to excite his inquiring mind. The westward journey in 1871 and a camping trip with his father in the Rockies gave material for his first papers, published in the *Scientific American* when he was twenty-two years old. A three-months' camping trip on Trinidad in 1878 and a trip to Cuba three years later were productive of eight papers dealing with a variety of geological features in those islands. Two text-books on minerals and rocks which have passed through several editions and are still in use, although written forty and forty-five years ago; a book and many papers on dynamical and structural geology; five papers on the origin of joints, a dozen on water supply problems and numerous articles on chemical geology, ore deposits, petrography, pegmatite veins, soils, elevated beaches and various problems in glacial geology; these indicate, although they do not measure, the scope of his geological interests. Nor do they include his highly important contributions to the areal geology of eastern Massachusetts, of which his three volumes on the geology of the Boston Basin are notable for their able treatment of a very complex region. The Boston Basin study was projected as his *magnum opus*, the three volumes in question being but parts of a great work intended to occupy eight volumes.

In the engineering profession Professor Crosby's advice as a consulting expert was highly valued, and his name is thus linked with important engineering projects in the United States, Alaska, Mexico and Spain, including the Catskill Aqueduct, the Muscle Shoals Dam, the Arrow Rock Dam, La Boquilla Dam (Mexico) and other enterprises of the first magnitude. In the mining world he was frequently called upon to solve problems relating to the origin and structure of ore deposits; and in the courts his testimony was commanded as an aid toward the solution of legal controversies involving geological principles.

It was as the man and teacher that the present writer knew best the subject of this sketch. Frequent passages through New York City made Professor Crosby a welcome visitor at Columbia University, where a little group of graduate students found in him a man who combined genial humor with an unaffected interest in their personal and professional plans. When one of these students was called to the Massachusetts Institute of Technology to begin his teaching career under Professor Crosby's leadership, he had opportunity to know at its best a sympathetic nature which shrank from inflicting pain on any living creature, and which was the logical fruition of the youth who in 1873 contributed to the *American Naturalist* a touching "Instance of Affection and Sagacity in a Dog." With Professor Crosby vegetarianism was not a fad, but a principle.

As a teacher Professor Crosby counted among his students a host of engineers and a goodly number of men who chose some form of geological work as a profession. These will long remember his class-room instruction enriched by a wide acquaintance with geological phenomena in different parts of the world, and his field excursions to many parts of a local area unusually rich in geological problems.

In 1876, Professor Crosby married Alice Ballard, and she and one son, Irving B. Crosby, survive him. For them and for all others who knew Professor Crosby intimately, one memory will always stand out clearly among the many which cluster about his name: the memory of a spirit which remained patient and cheerful while increasing deafness deepened the silence in which he passed the later years of his life. Happily his eyes were undimmed, and from his summer home in New Hampshire he enjoyed, as could few others, the majestic panorama of the Presidential Range. It is fitting that his ashes should return to the New England soil so early trod by his ancestors, and that his name should be carved on a slab of the rock to the study of which he gave much of his life.

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SCIENTIFIC EVENTS

THE NATIONAL PHYSICAL LABORATORY OF GREAT BRITAIN

THE report for the year 1925 of the National Physical Laboratory, just issued, states, according to the report in the London *Times*, that a good deal of research work has been accomplished besides the fundamental work involved in the maintenance of standards of measurement and of quality and performance. It is stated that experiments have been started with a view to finding a suitable method for making absolute measurements of sound intensity. With regard to the primary line standards, the report states that the present limit of accuracy attainable in comparisons must be taken to be about one hundred-thousandths of an inch. In this relation it adds: "A new four-meter standard bar has recently been obtained for work in connection with the verification of surveying tapes. Intercomparison of this with the previous four-meter