opinions, were accomplished with the president's support, for here as in other respects, there was perfect accord between the two executives.

In another direction the initiative came from Dr. Edsall. Since it is the growth of the sciences that has given rise to all the changes that we have considered, it is not surprising that the same cause should have modified the problems of college education for the future medical student. Signs of the new conditions became clear long ago, and I remember a still earlier conversation with President Eliot, when as a young instructor I tried, prematurely and probably with little success, to argue that college undergraduates had need of information about the new relations between chemistry and biology and medicine. At the beginning of the century little was to be done, but by the twenties the problem had become serious. Nearly ten years ago it led, on the initiative of Dr. Edsall, to the establishment in Harvard College of tutorial instruction that was carefully designed to meet the need. This experiment has prospered, and from the early years of college to the end of their medical education, it has already enabled many students to prosecute and organize their studies more broadly and with a better understanding of their needs and of their intellectual interests. Moreover, the presence of a group of young and able medical men among the corps of tutors in Harvard College has greatly strengthened the interactions between the two faculties. It has also established a balance among the biological activities of the Faculty of Arts and Sciences that American physiologists have long admired and envied in the University of Cambridge and that formerly was unattainable here. The appointment of one of the tutors, Professor Ferry, as Master of Winthrop House, is a significant result of this change.

So much by way of chronicle. But the chronicle is not enough, for in ending we must try to seize the continuous threads that run through the events.

Edsall's administration is a period of transition. I have tried to suggest that it is especially marked by the application to University policy of the two principles of *laissez faire* and of *laissez passer* that were already evident in the evolution of medical science. A conspicuous result has been the strengthening of old relations and the formation of many new relations within the University. The influences of *laissez faire* are, perhaps, chiefly attributable to spontaneous forces, but it is in great part the dean who, by applying the principle of *laissez passer,* has made the intercourse and the interrelations possible and, above all, it is the man himself who has promoted that spirit of good will and mutual aid in collaboration which is to-day one of the most fortunate traits of Harvard.

OBITUARY

CARL BARUS—1856–1935

IN the death of Carl Barus on September 20, 1935, Brown University lost a brilliant scholar and investigator, long internationally famous, and a beloved colleague who for forty years had ever been among us a source of inspiration. Although he had attained to nearly fourscore years he walked in our last commencement procession. But during that very week he underwent an operation from which after a gallant summer-long struggle he appeared to rally; the end finally came with startling suddenness.

Both of the parents of Professor Barus were Germans, who at different times had come to this country and finally settled in Cincinnati, where they were married. Their eldest child, Carl, was born there on the nineteenth of February, 1856. His early years were spent in an atmosphere of music, since his father, a leading musician of Cincinnati for more than twenty-five years, was director of numerous musical organizations and undertakings. Rehearsals were constantly held in his home, and his knowledge of certain operas and other music became minute; already before his teens he improvised much on the piano and composed sonatas in the style of Mozart. Later in life he devoted considerable time to composition, and the forty resulting works included a "March to Pembroke Hall," which was published in 1905. In 1874 he graduated as the silver medallist from the then notable Woodward High School, in the same class with William Howard Taft. Already his seethingly active mind was reaching out in various directions. With books and a telescope he acquired wide knowledge of the stars; an elaborate plumber's establishment offered the opportunity for considerable acquaintance with machinery and the tempering of steel; he experimented in a chemical laboratory which he had set up in his own home; he and a chum explored the flora cincinnatiensis and had a herbarium of about a thousand plants; he obtained a basic command of literary and scientific German, later to stand him in good stead.

In 1874 he became a student of mining engineering at Columbia University, but towards the end of his second year, his interest in pure science had become intense in the same degree that the allurements of engineering had waned. A college physical laboratory had not been thought of at Columbia at that time. For the next four years he carried on research in physics under Kohlrausch at Würzburg and received

[1] Minute spread on the Faculty Records of Brown University, October 1, 1935.

in 1879 the degree of doctor of philosophy, *summa cum laude*. His dissertation dealt with the questions of the determination of the relations of hardness of steel to its electrical and thermoelectric properties and to its magnetization. During the last years at Würzburg, young Barus organized a trio for cello, violin and piano, with himself at the piano, and the resulting performances of works of Haydn and Beethoven were highly acceptable. To the horror of Kohlrausch he also took lessons on the organ at the Königliche Musikschule. After his promotion as doctor he continued research at Würzburg until word arrived of an opening in the newly organized physical research section of the U. S. Geological Survey, of which the greatly gifted Clarence King was then director.

In July, 1880, Dr. Barus was appointed in charge of the purely physical work of the survey, and the first laboratory was in Nevada. The results of his research on such topics as electrical activity of ore-bodies and the relations of earth temperature and depth as found in shafts of different mines, soon appeared in print. Great varieties of research followed and were carried on in different places, New York, New Haven, Philadelphia and Washington. Through the unfortunate withdrawal of government grants Dr. Barus's connection with the survey was terminated in 1892, after twelve years of service, when he was in the midst of research which Lord Kelvin and others had pronounced to be of great importance. This period was not wholly devoted to notable scientific achievement; in 1887 he married Miss Annie Gertrude Howes, whose distinguished abilities, diversely employed outside of her home, in the service of college, city and state, are well known to this faculty. Also their son and daughter were born before the end of 1892. Dr. Barus was elected a fellow of the American Academy of Arts and Sciences in 1890 and a member of the National Academy of Sciences in 1892—the youngest man who had ever been so honored. During 1892–93 he was professor of meteorology at the U. S. Weather Bureau and in 1893–95 physicist at the Smithsonian Institution, assisting Langley in his experiments with flying machines, while carrying on much more absorbing research in physics. Various tentative calls to educational institutions were received, but the invitation by President Andrews, in May, 1895, to come as Hazard professor of physics to Brown University, to succeed Eli Whitney Blake, was the one to be accepted. He was then thirty-nine years of age and had published in the United States, England and Germany more than ninety papers treating of extraordinarily diverse topics. Ostwald and others agree that his paper on colloid silver, published shortly before coming to Brown, marked him as one of the founders of colloid chemistry.

Professor Barus taught for thirty-one years at Brown University and he became emeritus professor of physics in 1926. In 1903 he was appointed the first dean of the graduate department of the university, and his reports to the president during the succeeding twenty-three years reflect notable development and present many interesting passages, in finely expressed, vigorous English. His scientific research at Brown was incessant, and his published output of some 350 articles and monographs from 1895–1929 can only be regarded as tremendous. As a result, his honors accumulated, but only a few may be mentioned. He was a corresponding member of the British Association for the Advancement of Science; an honorary member of the Royal Institution of Great Britain, of the First International Congress of Radiology and Electricity at Brussels in 1905 and of the Physikalisch-Medizinische Sozietät at Erlangen; he was a member of the American Philosophical Society, and the fourth president of the American Physical Society in 1905 and 1906; with Woodward and Michelson he was a member of the advisory committee on physics appointed in connection with the organization of the Carnegie Institution of Washington, which later made many grants in aid of his research projects. In 1900 the Rumford Medal was awarded to him by the American Academy of Arts and Sciences for his researches in heat. He received honorary degrees of doctor of laws from Brown in 1907 and from Clark in 1909. He was a member of the group called together for organizing the National Research Council, and was active throughout the great war in his aid of the U. S. Government. In 1903 the physicists of America rated Professor Barus as second only to Michelson among all physicists of the country.

Merely a casual glance through the list of Professor Barus's papers impresses one with his amazing versatility, running as it did the whole gamut of the experimental physics of his time. Although not primarily a theoretical physicist, he was one of the few men who seemed equally at home in both realms of physical science. About the turn of the century he became particularly interested in the various phenomena connected with ionization in the atmosphere and his papers in this field attracted considerable interest and helped to focus attention on what has since proved to be an all-important tool for the investigation of atomic structure. In 1910 he began a series of researches on interferometry and from then until he stopped his scientific work in 1929 devised numerous important applications of his so-called displacement interferometer to measurements in spectros-

copy, gravitation and acoustics. He was a genius in the construction of apparatus and made with his own hands most of that used in his researches. It is interesting to speculate what his achievement might have been had he been fortunate enough to have had at his disposal even a part of the elaborate equipment of some of his contemporaries, to say nothing of that of the present-day experimentalist.

At Brown University Carl Barus and Alpheus Packard are undoubtedly the most eminent scientists who ever occupied faculty chairs. Professor Barus was a hero-worshipper, and in his home was a "genius corner" from which pictured faces of great scientists looked down upon him. He rejoiced in contacts with youth and had the great gift, in association and writing, of capturing the love of children. The breadth of his interests and achievements was extraordinary—recall his reading of Greek tragedies in the original, his knowledge of French and Italian literatures, and the proficiency he attained in playing violin, flute, clarinet, oboi, cornet, trumpet and trombone, in addition to the piano and organ. The brilliancy of his intellect, the modesty of his bearing, the beauty of his personality and the kindliness of his spirit have left most precious and inspiring memories with students and colleagues of forty years.

R. C. ARCHIBALD
R. B. LINDSAY

RECENT DEATHS

DR. DAVID C. GILLESPIE, professor of mathematics at Cornell University, for several years editor of *The American Mathematical Monthly,* died suddenly on October 13 at the age of fifty-seven years.

DR. ALBERT E. ROUSSEL, emeritus professor of medicine in the Graduate School of Medicine at the University of Pennsylvania, died on November 2 at the age of seventy-two years.

A CORRESPONDENT writes: Dr. Anna Laura Hintze, assistant professor of physiology and hygiene at Goucher College, who died on October 27, was a native of St. Louis. Dr. Hintze received her undergraduate and graduate degrees at the University of Wisconsin. For three summers she was a member of the staff of the Chesapeake Biological Laboratory at Solomon's Island, Md. She was a member of the American Ecological Society, of the American Zoological Society, the American Association for the Advancement of Science, Phi Beta Kappa, Sigma Xi and Sigma Delta Epsilon.

AN Associated Press dispatch reports the death on November 8, from the bites of ticks inoculated with typhus virus, of Dr. Jose Lemos Monteiro, of the Butantan Institute at São Paulo, and a week earlier that of his assistant, Dr. Edison Souza Dantas.

SCIENTIFIC EVENTS

INTERNATIONAL CONFERENCE ON TOPOLOGY

THE first International Mathematical Conference on Topology was held in Moscow from September 4 to 10 by the Mathematical Institute of the university. A similar Conference on Tensor Analysis and its applications took place a year ago, so it seems that the University of Moscow plans to hold a series of conferences on special fields in mathematics. The characteristic feature of these gatherings is that a small group of Soviet and foreign scientists come together for a few days, present full-length papers rather than the short summaries which a general mathematical congress would necessitate, and have abundant opportunity to discuss recent developments in their specialty. The conference this year was attended by a large proportion of the active topologists of the world, including the dean of topologists, Poul Heegaard, of Oslo, and also some very young men. Fifteen of the foreign delegates came from Europe and ten from America. These included van Kampen and Zariski, of Baltimore; Garrett Birkhoff, Stone and Whitney, of Cambridge; Paul Smith, of New York, and Alexander, Lefschetz, von Neumann and Tucker, of Princeton.

The foreign delegates were warmly welcomed and every comfort was placed at their disposal. This shows indisputably that the Soviet government wishes to promote pure as well as applied science, for topology would be difficult to justify to a strict materialist. One whole day as well as periods between the almost continuous lectures were occupied by sightseeing excursions arranged by VOKS (the Society for Cultural Relations with Foreign Countries) with a view to exhibiting the new Russian culture. The foreign visitors received tickets for the theater festival then in progress in Moscow, and were entertained at several receptions, one of which was almost a state banquet.

The participants all agreed that the conference was extremely worth-while. They expressed their gratitude to the mathematicians and officials of the U. S. S. R., and particularly to Professor Paul Alexandroff, who had taken the leading part in planning the conference. G. B.

THE FIFTEENTH EXPOSITION OF THE CHEMICAL INDUSTRIES

THE Fifteenth Exposition of the Chemical Industries will open at Grand Central Palace, New York,