ments—within the brain in far greater detail and without hindrance from the skull.

What can we expect if such a development occurs, as I think it is bound to do sooner or later?—when we can study the whole changing pattern of activity in the cerebral hemispheres from moment to moment?

It will not necessarily tell us much about a most important and characteristic property of the brain, its power of learning, of forming associations or conditioned reflexes, for this must depend on changes which are persistent and may not give rise to electrical effects. In fact, it may need a biochemical and histological survey to show us why the dog comes to salivate whenever the dinner bell is rung. But an electrical survey could scarcely avoid giving some entirely novel information about what is happening in the brain when we think or solve problems or decide what to do. The progress of neurology has been full of surprises and it will not do to predict: but sooner or later we are likely to reach a position where some very fundamental problems ought to arise. For example, in the brain of a conscious man will there be the same mechanical precision in the response of nerve cells and cell masses to the signals which reach them? Isaac Newton in one of his few excursions into neurology remarks that "the soul may determine the passage of animal spirits into this or that nerve and so may cause all the motions we see in animals." Is there any chance that we shall reach a position where such a possibility might be put to experimental test?

I have the feeling that we shall always find a catch somewhere, as I suppose the alchemists always did when it came to the final moment of projection. The problem may become more and more meaningless as we seem to come nearer to it, or perhaps it will become obvious that it is not one which could ever be solved by beings like ourselves. However, this really does not matter, for we can be quite certain of one thing: whatever the final outcome of inquiries about the mechanism of the brain there is an immense amount waiting to be found out on the way. It is almost within our grasp even now. Before the war the younger generation of neurophysiologists were advancing at a pace which accelerated every year, and those of us who dated back to the string galvanometer were already out of breath. When they come back again we may confidently expect to be left so far behind that these philosophic speculations will be our only consolation. The alchemists may have wasted their time in futile attempts to reach a goal which was not there, but they turned into chemists soon enough. In the same way the search for the mechanisms of the brain, though its goal, as we see it now, is perhaps unattainable, may lead us to a new understanding of human behavior—a synthesis of physiology and psychology. And with that in mind we can end with another quotation from Newton—which sums up what I have tried to say:

> As in mathematics so in natural philosophy the investigation of difficult things by the method of analysis ought ever to proceed the method of composition; and if natural philosophy in all its parts by pursuing this method shall at length be perfected, the bonds of moral philosophy will also be enlarged.

OBITUARY

FRANCIS PERRY DUNNINGTON
1851–1944

FRANCIS PERRY DUNNINGTON was born in Baltimore on March 3, 1851. At the age of sixteen he entered the University of Virgina, where he remained until called by death on February 3, 1944, just one month before his 93rd birthday. He graduated with the B.S. degree in 1871 and the following year received the degrees of C.E. and M.E. In the same year he was made adjunct professor of analytical chemistry and was promoted to a full professorship in 1884. From 1908 to 1919 he was professor of analytical and industrial chemistry, after which he retired from active teaching. He was a fellow of the American Association for the Advancement of Science and held membership in the American Chemical Society, the British Association for the Advancement of Science, the Chemical Society (London), American Electrochemical Society, the Franklin Institute and Phi Beta Kappa. When the first edition of "American Men of Science" appeared in 1906, a star was prefixed to the word *Chemistry* following Professor Dunnington's name, which means that he was ranked among the leading thousand scientists in the United States and one of the 175 American chemists whose work at that time was considered to be the most important.

Professor Dunnington's early training in chemistry was under that most able teacher and great chemist, John W. Mallet. He was associated with Dr. Mallet until the latter's retirement in 1908.

When Professor Dunnington graduated in the early seventies, the demand for chemists in industry was small and so he embarked on a career of teaching and investigation. He became recognized as one of the outstanding analytical chemists of his time. His publications number 68, many of them being joint reports on work with his students. Perhaps his greatest contribution to science was the discovery of the extensive

occurrence of titanium in American soil and rocks. While he never engaged in industrial activities, his influence in this field was far-reaching and it must have been a source of great satisfaction to him to know that many of his students have contributed in a large measure to the development of American industries. His former students include many well-known chemists and engineers.

The Charles Herty Medal was awarded Professor Dunnington in 1935 by the Georgia State College for Women at Milledgeville, Ga., "for excellent service in the field of chemistry in the South . . . and especially for his splendid record as a teacher of chemists who have attained renown." The late Dr. Charles L. Reese, for many years chemical director at E. I. du Pont de Nemours and Company, and an old student of Professor Dunnington, has written affectionately of him in *Industrial and Engineering Chemistry* (22: 1408, 1930), under the caption "American Contemporaries." Here are mentioned many of his most prominent students. Dr. Reese's description of Professor Dunnington and a personal incident during his student days at the university are well worth quoting.

> Tall, red-headed (but lacking the fiery disposition usually accompanying this characteristic), a gentle, kindly face—Dr. Dunnington presented an imposing personality. In addition to having the faculty of thoroughly imparting knowledge, he took a real personal interest in his students even to the extent of caring for them when they became ill. I recall vividly an instance in my own case when I was a student at Virginia. I had been suffering from an ailment and Dr. Dunnington one day noticed my apparent indisposition. He promptly sent me to his own home, where his kind hospitality and watchful care were extended to me until I was restored to normal health. Thus, his home came to be regarded by his students as a sort of haven to which they could go in times of distress, whether physical, mental or spiritual. The very atmosphere of his home, made more charming by the presence of his lovely wife and children, was an inspiration. He was imbued with a radiating spirit of brotherly love that endeared him to his associates, and outside of his duties of teaching chemistry "he went about doing good."

Professor Dunnington's activities were not confined to university duties. He always took an active interest in the welfare of the community. The installation of a modern sewage system for more than a hundred buildings in the university area was due to his efforts and personal supervision. This and many other local civic improvements are the result of his efforts. For many years he was an elder in the Presbyterian Church in Charlottesville and he was an ardent supporter of the cause of temperance. After his retirement from teaching in 1919, he devoted himself to a number of activities, much time being spent cataloguing the chemical museum of the Cobb Chemical Laboratory, working on the solubility of borates and writing several philosophical articles from a religious standpoint. Until recent years when his health began to fail, Professor Dunnington spent many pleasant hours working in his garden and each fall would gather baskets of apples and pears which he enjoyed giving to friends.

Francis Perry Dunnington, known affectionately by his former students and friends as "Old Dunny," will long be remembered as an exceptional teacher—patient, thorough, kind-hearted and fair. He emphasized the importance of being able to do a job with the materials and apparatus at hand, and by his own ingenuity in this respect he developed this worthwhile trait in his students. In his passing, the University of Virginia and the city of Charlottesville, where he lived and labored for more than three quarters of a century, have lost one of their great personalities. He was a scholar, a scientist, a teacher and a Christian gentleman of the Old South.

JOHN H. YOE

RECENT DEATHS

DR. JAMES CONNER ATTIX, since 1904 until his retirement in 1943 professor of chemistry and toxicology at Temple University, Philadelphia, died on April 20 at the age of seventy-four years.

FRANKLIN B. HANLEY, instructor in geology at the University of Minnesota, died on April 24 at the age of forty-five years. Mr. Hanley had been on leave from the university since June, 1942, to serve as executive secretary at the Naval Radio and Sound Laboratory at San Diego, Calif.

CHARLES E. HELLMAYR, associate curator of birds of the Chicago Natural History Museum, has died in Switzerland at the age of sixty-six years. He was the principal author of "The Birds of the Americas."

DR. JAMES CRAWFORD SIMPSON, who retired in 1941 as professor of histology and embryology and dean of the faculty of medicine of McGill University, died on April 20 in his sixty-eighth year.

SCIENTIFIC EVENTS

THE PROPOSED NATIONAL RESEARCH COUNCIL FOR INDIA

THE National Institution of Sciences of India, according to *Science and Culture*, Calcutta, has passed the following resolutions advocating the founding of a National Research Council.

(1) That it is necessary to establish at an early date a National Research Council of India under the statutory authority of the Government of India.