lines seem to be quite similar to those of the sun's spectrum. They have, however, a hazy appearance which is doubtless due to the fact that they record light scattered by different portions of the corona in the line of sight. That the Fraunhofer spectrum of the corona is caused by the scattering of sunlight by coronal material in a finely divided state is substantiated by the fact that the light of the corona is polarized. Measures by R. K. Young of the photographs obtained with polarigraphs by Lick observers show that the polarization is radial and that the percentage of polarized light increases rapidly from the sun's limb, reaching a maximum of 37 per cent. at a distance of 5′, and then diminishes slowly as the distance from the limb increases.

On the spectrograms secured in 1922, I measured the positions of the Fraunhofer lines in the coronal spectrum at points east and west of the sun and found that these were displaced toward the red with reference to the ordinary solar lines. The displacements, interpreted as a Doppler-effect, indicate radial motion of the coronal particles at points 20′ east and west of the sun's limb of about 12 or 15 miles per second, a speed of the same order as that found by Miller. These results are subject to considerable uncertainty on account of the character of the spectra measured. For this reason an attempt was made to repeat the observations at the eclipse of last August, with spectrographs especially designed for this particular problem. Unfortunately, the value of the spectrograms secured is somewhat impaired by the effect of scattered light from the clouds covering the sun during totality. Preliminary measures of these plates indicate the presence of small displacements in the Fraunhofer lines of the corona east and west of the sun, corresponding to a velocity of recession of about ten miles per second. At present we have no reliable information concerning the rotation of the corona.

Our knowledge of the total light of the corona and the distribution of its intensity with distance from the sun is still in an unsatisfactory state. The most reliable information we have at present, concerning the total brightness of the corona is to the effect that it is about 0.50 that of the full moon, although it probably varies with the cycle of solar activity. Observations of this character are beset with numerous difficulties but those made by recent investigators give evidence that many of them have been overcome. A most thorough investigation of the distribution of coronal intensity with distance from the sun was made by Bergstrand, who brought to this problem many years of experience in the methods of photographic photometry. He found that the intensity of coronal light in the photographic region varies inversely as the square of the distance from the sun's surface. Other observers have derived the law of variation to be according to the fourth, sixth, seventh and eighth powers.

Of coronal theories there is a sufficient number to permit of choice according to the particular phase of coronal studies in which one happens to be interested. Mechanical, electric, magnetic and other theories have been suggested, but in the present state of our knowledge with respect to the phenomena of the corona, it would not be profitable to give serious consideration to any of them. A corona composed of electrons and ions will account for many of the phenomena, especially those associated with its radiation. While there is much to commend the theory, it too meets with its share of difficulties.

The problems of the structure of the chromosphere and the corona are many and the solutions for a number of them are still to be given. Most encouraging progress has been made in unraveling the structure of the chromosphere, largely through the aid of the recent developments in our ideas of the behavior of the atom under different conditions and the manner in which it radiates energy. Regarding the corona our knowledge is in a less advanced state, but the time is not far distant, in my opinion, when many of its complex phenomena will receive a satisfactory interpretation.

OBITUARY

ACHILLES DE KHOTINSKY

ON March 28, 1933, occurred the death, in Pentwater, Michigan, of Captain Achilles de Khotinsky, who, through his genius in invention, design and construction, leaves a permanent impression on physics and chemistry in America. Captain de Khotinsky was born on January 6, 1850, in St. Petersburg, Russia. Having completed the course in the Imperial Naval Academy, he spent the next 13 years in the Russian navy, in which he attained the rank of captain. It was during this period, in 1878, that he first saw America, while on commission to supervise the construction of three battle cruisers for the imperial navy. In the late seventies he obtained European patents on incandescent lamps which he manufactured on a large scale in Russia, Germany, Austria, England, France and Holland. He also held a basic French patent on the pasted storage battery plate. While in England, he developed the widely used de Khotinsky cement, known to every research physicist as indispensable in investigations involving vacuum technique.

Returning to America in 1891, he established an incandescent lamp factory in Massachusetts. As a result of patent difficulties, the plant was closed after about a year of operation. Deprived of practically all he possessed, he came west, spending about a year at Purdue University. In the middle nineties he located at Chicago. During the next twenty years he was associated with various firms and institutions, among them the Western Electric Company, Wm. Gaertner and Company, Armour Institute of Technology and the University of Chicago. Many physicists and chemists who obtained their degrees from Chicago will affectionately recall "the Captain," as he was always known to his associates and acquaintances. He spent eight years with Professor Michelson at Ryerson Laboratory, designing and constructing research apparatus and ruling diffraction gratings, after which he spent some years in Kent Laboratory as research mechanician. In 1916 he joined the development staff of Central Scientific Company, where he remained until 1922. Here he developed miscellaneous constant temperature devices, including ovens, water baths and thermoregulators. His contributions to design and production methods of military instruments which the company manufactured for the government during the war were numerous.

In 1922 Professor Randall, of the University of Michigan, asked the writer to suggest some one who might undertake the design and construction of a dividing engine for ruling special diffraction gratings, to be used in researches in the region of the longer wave-lengths. No one seemed better qualified than Captain de Khotinsky. Although 72 years old at that time, he was happy for the opportunity of spending the next few years in the kind of work he loved and in most congenial and pleasant surroundings. In three years the ruling machine was completed and in operation. Not the smallest part of his achievement was the method of shaping the diamond ruling points to produce grooves of predetermined shape, by means of which intense spectra in selected wave-length regions could be obtained.

In 1926 Captain de Khotinsky retired to Pentwater, to spend his declining years.

His achievements are numerous. In engineering he has to his credit many inventions and patents on incandescent lamps, storage battery plates, and automatic gun-firing devices. He devised the first switchboard signal lamp. In physics he is best known for his de Khotinsky cement and his work in the production of diffraction gratings, while chemists and bacteriologists will remember him for his laboratory devices for the maintenance of constant temperatures.

PAUL E. KLOPSTEG

RECENT DEATHS

DR. JERMAIN GILDERSLEEVE PORTER, professor of astronomy at the University of Cincinnati and director of the Cincinnati Observatory from 1884 to 1931, died on April 15 at the age of eighty-one years.

MRS. ZELIA NUTTALL, honorary special assistant at the Peabody Museum of Harvard University and honorary professor of archeology at the National Museum of Mexico, died at her home in Mexico City on April 12, in her seventy-fifth year.

THE death is announced of Dr. Ernst Grossmann, professor of astronomy at Munich.

THE Duke of the Abruzzi, who conducted explorations in Africa, India and the far north, died on March 18, aged sixty years.

JULES PICCARD, for forty years professor of chemistry at Basle, died on April 11. Dr. Piccard was the father of Dr. Auguste Piccard, professor of physics and physical measurements and director of the laboratory of physics at the University of Brussels, who is now visiting the United States.

SCIENTIFIC EVENTS

THE EIGHTIETH ANNIVERSARY OF THE FOUNDING OF THE CALIFORNIA ACADEMY OF SCIENCES

ON April 4, the eightieth anniversary of its founding was celebrated by the California Academy of Sciences in its Simson African Hall, where a preview was arranged of the installations of habitat groups of African mammals which are now in a stage of particular interest. At this function, there was a brief address of welcome by Mr. William H. Crocker, the president of the Board of Trustees, who has held this position since 1897. Dr. C. E. Grunsky, president of the academy for over twenty-one years, referred briefly to the history of the academy as a scientific research and educational institution, whose activities since its inception have been made possible by generous contributions and endowments from private individuals, outstanding among which is that of James Lick some sixty years ago. The Lick endowment placed the academy in unrestricted ownership of downtown property in San Francisco, the improvements on which, made with borrowed money, yield most of the income which makes its activities possible.

When Mr. Leslie Simson some years ago made his offer to furnish to the academy, free of cost, specimens of African mammals which would be needed for