

in parallel with the arc. Besides the usual experiments, the existence of a large number of harmonics may easily be shown by means of resonance. The current in the neighborhood of the discharge is much greater than that taken from the mains, owing to the conversion of direct-current into alternating-current energy. For these experiments an e.m.f. of at least 400 volts, alternating, or better direct, is necessary.

WALTER G. CADY

MIDDLETOWN, CONN.

SOCIETIES AND ACADEMIES

THE AMERICAN PHILOSOPHICAL SOCIETY

Halley's Comet: C. L. DOOLITTLE.

The return of Halley's comet in 1910 has naturally been looked forward to with great interest by astronomers and others. For the purpose of encouraging investigation of the circumstances of its return, a prize of 1,000 Marks was offered by the *Astronomische Gesellschaft* in 1904. A very complete discussion of the available data was carried out by P. H. Cowell and Andrew C. D. Crommelin, of Greenwich. It has been referred to in various places under the motto, "Isti mirantur stellam." The prize was awarded to this discussion.

As soon as the region where the comet was expected to be found had emerged from the sun's rays in 1908, search was undertaken, photographically, in this country and Europe. This was continued until the sun's rays again interfered, but without result. On resuming the process during August of the present year, impressions were found on several plates, the first to achieve success being Dr. Wolf, of Heidelberg. He first detected the image on a plate taken August 28, but did not venture to announce his discovery until September 11. Two plates were taken at Greenwich on September 9. At first nothing was found on either, but a reexamination afterwards showed faint images of the comet on both. It is barely possible that a reexamination of the plates taken last winter may show faint images of the comet, but nothing has been announced up to the present time. It is now easily visible with the 18-inch telescope of the Flower Observatory. The ephemeris of Messrs. Cowell and Crommelin at the time of discovery required a correction of 25 seconds in right ascension and 4 minutes in declination, which must be consid-

ered remarkably satisfactory when we remember that the last observations at their disposal were made nearly seventy-four years ago. The time of perihelion passage, given in this discussion, seems to require the correction of 3.4 days, which makes the date April 20, 1910. Another examination of this point gives for the date April 18.63. The nearest approach to the earth will be May 19, distance about 14,000,000 miles, but it will then be so near the sun that it will probably not be visible. On May 18.14, Greenwich mean time, the earth and the comet will be in heliocentric conjunction. It is not unlikely that, on this date, the earth will pass through the tale of the comet. The date when it will be visible to the naked eye is quite uncertain, but probably it will be bright enough for this purpose some time during February, when it will be seen in the western sky after sunset. Toward the end of March, after passing the sun, it appears in the morning before sunrise, reaching its greatest apparent distance from the sun early in May. Toward the middle of May, it again passes the sun and reappears in the evening sky.

Halley's investigation of this comet forms an epoch in astronomical history, but it must be confessed that considerable courage on his part was required to make the prediction of its return in 1759. Probably if he had been aware of the uncertainty attending the identification, depending on the period alone, he would hardly have ventured to make it. Examination of ancient records indicates a succession of visits, extending back to 240 B.C., with the very considerable range of a little more than five years between the longest and shortest period. With such a range some of these supposed appearances must be regarded as resting on rather slight foundation. A committee appointed by the Astronomical Society has formulated a plan for keeping the comet constantly in view, by interesting a series of observers, so placed in latitude and longitude that the comet shall never be lost sight of. A series of photographs, taken in this way, giving a continuous history of the comet, should go far toward solving a number of problems connected with the physical behavior of these bodies.

THE BIOLOGICAL SOCIETY OF WASHINGTON

THE 461st meeting was held November 13, 1909, with President Palmer in the chair. The following communications were presented:

The History of the Mule-footed Hog: W. J. SPILLMAN.

The mule-footed hog differs in no important particular from the common breeds of swine save in the solid instead of cloven hoof. The foot character is probably made by the coalescence of the ungual phalanges. The metacarpals, basilar phalanges and middle phalanges are separate as in ordinary hogs. The claim of breeders that the mule-foot possesses hog cholera immunity is not borne out. Four such hogs at Indiana University died after exposure to this disease. The writer had gathered, though from study of but few specimens, that the foot character is on the whole disadvantageous, especially in heavy hogs. The breed is widely distributed in the United States, especially in the middle west and south, and two breeding associations for the registration of mule-foots have been formed. Evidence at hand indicates that solid-hoofed hogs have come down from ancient times, and perhaps the character has been found in certain strains of hogs since these animals were first domesticated.

In crosses between mulefoots and ordinary breeds the mulefoot character is more or less dominant. Some mixed-bred hogs have at birth solid hoofs which split apart usually at about nine months of age, and in some the rear toes split apart, while the front toes remain solid through life.

A Phylogenetic Tree Adapted for Use in Schools:
W. P. HAY.

Professor Hay distributed large cards on which were printed botanical and zoological phylogenetic trees. The groups were illustrated by figures of a typical animal or plant with the enlargement or reduction indicated, and the figures of microscopical forms indicated by enclosure in a circle. He explained his use of the trees in teaching, and called attention to their defects and limitations as an expression of relationship. The subject excited general discussion.

The Migrations and Recent History of the Eskimo Curlew: W. W. COOKE.

The Eskimo curlew is almost extinct. Two were shot August 27, 1908, at Newburyport, Mass.; a few were reported by Dr. Grenfell on the Labrador coast the fall of 1906; Bigelow spent the entire fall of 1900 on this coast and saw only five birds and heard of about as many more. The last previous record in the United States is that of two at Nantucket, Mass., August 18, 1898, and the last specimen known from the interior of the United States was taken by Paul Bartsch at Burlington, Ia., April 5, 1893.

Yet this species was once exceedingly abundant. All writers from Cartwright in 1770 to Coues in 1860 testify to their enormous numbers in fall migration on the Labrador coast. Packard in 1860, speaks of a flock a mile long and a mile wide.

The Eskimo curlew had an elliptical migration route; it nested on the barren grounds of Canada, went southeast to Labrador and Nova Scotia, then straight south across the Atlantic Ocean more than 2,000 miles at a single flight to the Lesser Antilles and South America; it wintered on the pampas of Argentina and in spring went north by way of Texas and the Mississippi Valley in a narrow belt on both sides of 97°.

It retained its former abundance until the late seventies or early eighties and then in about ten years the species became almost extinct. Some of this diminution is probably due to the fact that during these years the part of the Mississippi Valley through which it migrated was largely brought under cultivation. But the most potent factor has been the changing of its winter home—where it spent one half the year on the pampas of Argentina—from sparsely settled grazing lands to enormous wheat lands. During the years 1878–1892 Argentina increased its wheat production fifty-fold and the pampas-loving Eskimo curlew suffered.

M. C. MARSH,
Recording Secretary

THE AMERICAN CHEMICAL SOCIETY
NORTHEASTERN SECTION

THE ninety-fourth regular meeting of the section was held at the Twentieth Century Club, Boston, on October 22. Dr. W. D. Harkins, of the Massachusetts Institute of Technology, in an address upon "Smelter Smoke" described the nature and extent of the damage done by arsenic and sulphur dioxide emitted from the large copper smelters of this country, and commented on the various methods which have been tried for lessening these evils.

Dr. G. S. Forbes, of Harvard University, presented a paper upon "The Relation between Wavelengths of Light and Photo-chemical Action." After summarizing the most recent experimental work in this field and stating the theoretical deductions, the speaker dwelt upon the vast opportunity for investigation offered in the study of the rôle of light in bio-chemical reactions.

K. L. MARK,
Secretary