combine with salts.[15] Indeed it is virtually impossible to prepare protein free from ash.[16] It may be that salts enter protoplasm by combining with protein in the membrane. Even if this mechanism prove ultimately not to exist, all the possibilities are not exhausted. The lipoids, kephalin and lecithin, occur in combination with potassium and sodium.[17] These compounds are freely soluble in anhydrous ether. The metal is not completely masked, but can become to a slight degree dissociated. Perhaps it is by forming such compounds that metals enter cells.

I hope I have shown that by the methods of the organic chemist alone we can not hope to achieve much insight into the mechanisms of protoplasm. These mechanisms are dependent upon structure and this organic chemistry is not capable of revealing. The mechanisms are themselves interrelated and coordinated. These relations and coordinations are not capable of study by the usual analytical methods. The process of analysis destroys them as it destroys life itself of which they are the most characteristic manifestations. These characteristics of life can be approached only from the basis of structure of some sort. For a proper understanding of it, anatomical, chemical and physical knowledge must be combined. The resultant alone offers the hope of widening our knowledge of the mechanisms of cell activity.

CARL L. ALSBERG

[15] Cf. Mathews, A. P., "A Contribution to the General Principles of the Pharmacodynamics of Salts and Drugs," "Biological Studies of the Pupils of W. T. Sedgwick," pp. 103–4, Boston, 1906.

[16] Harnack's ashless protein is really a protein with volatile ash—HCl. *Berichte der deutschen Chemischen Gesellschaft*, Bd. 23, S. 3745, 1890.

[17] Koch, W., and Pike, F. H., "The Relation of the Phosphatids to the Sodium and Potassium of the Neuron," *The Journal of Pharmacology and Experimental Therapeutics*, Vol. 2, p. 245.

THE TOTAL SOLAR ECLIPSE OF APRIL 28, 1911

[PRELIMINARY COMMUNICATION]

ON the way to meet the *Carnegie* at Colombo, Ceylon, I was so fortunate as to make immediate connection at Suva, Fiji, for Apia, Samoa, by means of a small steamer, the *Dorrigo*, chartered by the German government to carry the mail. I journeyed next to Pago Pago, Tutuila, 80 miles distant from Apia, chartering a 30-ton motor boat and arriving at Pago Pago on Monday, April 24. Laying my plans before his excellency, the governor of Tutuila, Samoa, he very courteously put at my disposal the U. S. cruiser, the *Annapolis*, and furthermore gave me the assistance of some of his best officers and men.

When I left Washington on March 16 the possibility of getting into the belt of totality in time seemed too small to warrant taking with me skilled assistants or elaborate outfits for chance eclipse observations. However, I took two magnetometers and Mr. Abbott, of the Smithsonian Institution, kindly provided an improvised hand-driven, double-lens camera of about 11½-foot focus; everything was packed in water-tight cases so as to be prepared for difficult landings. I decided, namely, to get, if possible, on one of the islands not occupied by any eclipse party which, while equally desirable, were not as accessible as the Tongas where all the parties congregated.

The *Annapolis* left Pago Pago, Tuesday night, April 25, and arrived at Tau Island—the nearest accessible island in the belt—the following afternoon. The entire outfit was landed without mishap through the breakers on the northwest side of the island, near the village of Tau; this part of the work was entrusted to Capt. Steffany, a well-known pilot in these waters. By the time the instruments were unpacked and assembled and suitable sites chosen, night came on. We were comfortably quartered in Vaitupu's house, the widow of Tuimanua, who died a couple of years ago and who, during his time, was the most powerful king of the Apanua group.

She, as well as the Samoan chiefs and the natives, showed us every possible courtesy and hospitability and evinced great interest in the success of our work. The party was entertained by the "village fathers" at a native feast and Vaitupu gave a siwa in our honor.

Thursday, the day before the eclipse, unfortunately, was cloudy and showery and our preparations were greatly retarded in consequence. As my chief object was to ascertain whether there might be any possible magnetic effect during the eclipse, I had to pay prime attention to the magnetic observations and to the training of an assistant, Quartermaster Urle, of the *Annapolis,* for taking readings of the magnetic declination every minute for about five hours on the day of the eclipse.

I was fortunate in being able to turn the charge of the photographic work over to Lieut. McDowell, U. S. N., in command of the *Annapolis;* he was assisted by Messrs. Reed and Steffany, also by Dr. Connor and Chaplain Pierce—all of the *Annapolis.* I made the necessary calculations for the orientation of the camera and laid out the necessary lines for guidance in the placing of the camera. Owing to the inclement weather the day before, it was not possible to get the camera finally mounted and in proper position until shortly before totality. The day of eclipse was fortunately clear throughout. There was no opportunity for trying out the finding telescope and slow motion screws in declination and right ascension.

Just before totality, Lieut. McDowell found that he could not use the finder and so rigged up a hastily constructed sighting device for keeping the sun's image centered on the plates and eliminating the diurnal motion. Two exposures of 15 seconds and two of 1 m. 10 s. were obtained. When the plates were developed, it was found that the improvised sighting device had not been wholly successful and so the photographs exhibit effects due to diurnal motion. Apart, however, from these defects, the photographs show clearly not only the inner corona but also most interesting details and coronal extensions reaching out over one half of the sun's diameter. The present corona thus fulfilled the expectations of great development during a sun-spot minimum.

The mean duration of totality, as observed at shore by Lieut. McDowell and Dr. Connor, and aboard the *Annapolis* by Lieut. Baker, U. S. N., was 2 m. 1 s. The great coronal extensions which were chiefly in the sun's southwestern and northeastern edges were not seen visually, for some reason, by any member of the shore party nor by the party aboard the *Annapolis* anchored a few miles distant, in Faleasau Bay. They were, however, seen by two observers to my knowledge, in the Tongas, viz., Capt. Holford on board the *Tofua* and by Mrs. Clement Wragge, who with her husband, the well-known meteorologist, was located near Hapaii, Id.

It is greatly to be regretted that the better equipped and specially trained astronomical parties at Vavau, Tonga, were not blessed with the singular good fortune which befell us at Tau Island. For our prime work—magnetic—it would not have mattered had the weather been bad.

According to special arrangement magnetic observations simultaneous with ours at Tau were made at the five coast and geodetic survey magnetic observatories, also at Melbourne, Christchurch and Apia, where quick-run magnetograms were obtained for five hours. Until the records have been received from stations over the entire globe, it will not be possible to determine definitely whether or not the present eclipse was accompanied by any minute and temporary change in the earth's magnetism.

L. A. Bauer

The Carnegie,
Colombo, Ceylon,
June 21, 1911

SAMUEL CALVIN

Some weeks ago there appeared in Science a brief notice of the death, on April 17, of Professor Samuel Calvin, head of the department of geology in the University of Iowa, and state geologist of Iowa.