under process of deposit, with intermediate and subsequent periods during which new supplies appear from some source not yet clearly explained.

Prof. Amos Peaslee Brown stated that it had been suggested by Russell that the red color of certain formations may have originated from the subaërial decay of iron-bearing rocks and the subsequent deposit of this material as sediment forming the red rock. Such rocks as contain iron, especially limestone and the metamorphic schists, would weather in the atmosphere to reddish clays, and during periods when denudation of the surface was not active, or when the land remained at constant level, such weathered accumulations could form to considerable depths. A rise of land level would cause denudation of this accumulated red soil and result in deposit elsewhere. The periods preceding the formation of the Mauch Chunk red shale and the New Red or Trias were such periods of quiescence and they were followed, in the first case locally and in the second generally, by elevation of land causing denudation to be set up and accumulation of red clays to be formed.

So far as the ash of coal is concerned, it is probable that the color is due to the way in which pyrite is contained either in the coal itself or in the slates adjoining. Coal containing separable pyrite would give white ash, while if the pyrite is intimately mixed in the coal the ash will be red.

The subject was further discussed by Messrs. Heilprin, Willcox, Goldsmith and Lyman.

Mr. Jos. Willcox and Prof. Angelo Heilprin commented on the evolutionary value of the large collection of Fulgurs presented at the last meeting, the former claiming that about twenty-five species had been reduced, by the presence of complete series of intermediate forms, to three or four.

EDW. J. NOLAN,
Secretary.

NEW YORK SECTION OF THE CHEMICAL SOCIETY, MARCH 6, 1896.

THE papers presented were:

The Cassel-Hinman Gold and Bromin Process: P. C. MCILHINEY.

The Specific Gravity of Glue Solutions: E. R. HEWITT.

Investigations in the Chemistry of Nutrition: W. O. ATWATER.

Mr. McIlhiney enumerated the advantages of bromin over chlorine in the gold extraction process, as (a) greater solubility in water of bromin, 3.2 per cent. against 0.76 per cent. of chlorine; (b) lesser oxidizing power, whereby the iron pyrites is less acted upon; (c) greater solvent power of bromin for gold.

The bromin is recovered by distillation with live steam in stone tanks, after addition of sulphuric acid and an oxidizing agent, as permanganate of potash.

The process is especially adapted to the treatment of low grade telluride ores which have not hitherto been profitably worked.

Mr. Hewitt in his work on specific gravity of glue solutions had obtained his results from experiments on twelve different grades of glue, from the best photographic gelatine to the darkest and poorest grades in the market. He finds the expansion of glue solutions to be the same as water alone; that the specific gravity of glue containing moisture is less than of glue in the dry state; that the hydrometer could not be used in solutions containing over 65 per cent. glue, and that the specific gravity is independent of the quality of the glue.

He concludes that there is a series of distinct chemical combinations of glue with water.

Dr. Atwater described the recent work under his direction at Middletown, Conn., in determining the heats of combustion or fuel values of foods. He said that 'we know the laws of the conservation of energy hold good in the living organism, but we do not yet know *how* they held good. We must study these things in the living organism, and for this purpose a 'respiratory calorimeter' has been constructed of copper, large enough for a man to remain in for some time, and by which the experimental determination of heat of radiation, energy of food consumed, etc., is to be carried out.'

Experiments lasting four days had recently been made, and it was expected to arrange to keep a man in the apparatus by the week.

Eight attendants were required to conduct these experiments, four by day and four by

night, keeping temperature records, weighing the food, making analyses, etc.

In reply to questions as to effect of food on the quality of the fat, Dr. Atwater stated that experiments made on dogs had conclusively proved that the fat formation is a function of both the organism and the food.

DURAND WOODMAN,
Secretary.

GEOLOGICAL CONFERENCE OF HARVARD UNIVERSITY, FEBRUARY 18, 1896.

1. *An Occurrence of Theralite in Costa Rica.* By J. E. WOLFF. To be published in Amer. Jour. Sci., April, 1896.
2. *The Harvard Meteorological Stations in Peru.* By R. DEC. WARD.

In 1887 a considerable sum of money was left to Harvard College Observatory by the will of Mr. Uriah A. Boyden, to aid in the establishment of an observatory "at such an elevation as to be free, so far as practicable, from the impediments to accurate observations which occur in the observatories now existing, owing to atmospheric influences." In order to select the best possible location for the new observatory, expeditions were undertaken, in 1888 and 1889, to Colorado and California, where astronomical work of various kinds was done at a number of different places. None of the stations thus temporarily occupied proved entirely satisfactory, and it was finally decided to establish the new station in Peru, where Messrs. S. I. and M. H. Bailey had, in the mean time, obtained some excellent results in connection with astronomical work done by them for the Harvard College Observatory on Mt. Harvard, in Peru. The expedition which was sent out to build the new observatory left the United States, under the direction of Prof. Wm. H. Pickering, in December, 1890, arriving at its destination the middle of the following January.

The meteorological advantages for astronomical work in the region selected for occupation are very great. The temperature seldom falls below 40° and seldom rises above 75°. The rainy season is very short, and but little rain falls, generally less than four inches. November marks the beginning of the cloudy season; December is fairly clear, and January to March are cloudy and rainy. During the rest of the year the atmosphere is very dry, and the sky prevailingly clear. In the rainy season it by no means rains every day, there being often a week or a fortnight during which no rain falls. The excessive dryness of the climate, in which vegetation is maintained only by constant irrigation, the short rainy season and the small amount of cloudiness combine to make this a most favorable region for astronomical work.

There are at present eight meteorological stations in Peru, maintained by the Harvard College Observatory. The principal one is at Arequipa, where the observatory is situated at an altitude of 8,050 feet above the sea, and about 80 miles from the coast. The city itself is situated in a little oasis formed by a river valley at the foot of the Cordillera, a little above the lower-lying desert. At Mollendo, on the seacoast, there is a meteorological station 85 feet above sea level. Between Mollendo and the main station at Arequipa, another station has been established, at La Joya, about in the center of a rainless, barren region, and at an elevation of 4,140 feet. The most interesting station of all is that on the summit of the volcano El Misti, 19,200 feet above the sea, lying northeast of Arequipa, about ten miles distant. This station, established after much hardship and maintained with considerable difficulty, is now the highest meteorological station in the world. Mr. S. P. Fergusson, of Blue Hill Observatory, Massachusetts, has recently constructed a meteorograph for the Misti, which records automatically temperature, pressure, humidity, and wind direction and velocity, and will run three months without rewinding. This instrument will obviate the necessity of the frequent visits now made to the summit by the observers at Arequipa.

The other stations are as follows: Flank of El Misti, 15,700 feet, about the altitude of Mont Blanc; Alto de los Huesos, 13,400 feet, a high desert plateau east of El Misti; Cuzco, between the eastern and western Andes, 16,100 feet, and Santa Ana, east of the Andes, in the Urubamba Valley, 3,400 feet above the sea.

This continuous line of stations, reaching from the coast inland over 350 miles, and including such great altitudes as the summit and flank of