

and the living, rather than of the didactic and the transcendental, that he is perennial and immortal.

APPLETON MORGAN.

LETTERS TO THE EDITOR.

**.* Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

The editor will be glad to publish any queries consonant with the character of the journal.

On request, twenty copies of the number containing his communication will be furnished free to any correspondent.

Kiowa County, Kan., Meteorites.

A REMARKABLE fall of meteorites of unknown date in Kiowa County, Kan., has recently been brought to the knowledge of the scientific world. Many of the citizens of Greensburgh, the county seat, were aware of the existence of these strange irons, and commonly called them meteoric; but there seems to have been no suspicion of their true character and value. Indeed, until the 17th of March, 1890, a specimen weighing 101.5 pounds had ornamented the sidewalk in front of a real estate office in the above-named town for about three years. The farmers in the vicinity of the locality where the fall had occurred had put some of the specimens to various uses.

They were first observed by cowboys, long before that portion of Kansas was open to settlement, while it was still a portion of the unrestricted cattle-range of western Kansas. The specimen before referred to, with two others of somewhat smaller size, had been removed from its original location by a cowboy, and buried at the head of a gulch about a mile distant. The cowboy had intended to carry the irons to Green's stage station, about eight miles distant, but was unable to transport so heavy a weight upon his pony. This was in 1885. The town of Greensburgh was laid out in that year, before the close of which the cowboy was taken sick, and died. Before his death, however, he informed two or three citizens of Greensburgh of his burial of the three strange stones. These citizens, about a year later, searched for and found the meteorites, bringing them in to Greensburgh.

Professor F. W. Cragin of Washburn College was the first scientific man who visited the farm upon which these masses had fallen, this visit occurring on March 13. He secured from one of the farmers five meteorites, aggregating in weight over a thousand pounds, the heaviest specimen weighing 466 pounds.

Professor Robert Hay arrived on the spot March 14, but did not obtain any specimens. The writer reached the interesting locality on March 17, and obtained one of the Greensburgh specimens which had just been secured by the farmer. He made a second visit on the 22d, securing the two remaining Greensburgh specimens, thus obtaining all three of the masses which had been removed by the cowboy. He made a third visit March 29, securing two other specimens, which had been obtained by the farmer from his neighbors. The weights of these five specimens are respectively 101.32, 71.50, 54.96, 52.82, and 35.72 pounds. These weights have been accurately determined (except that of the 71.50-pound mass) by the United States standard scales in charge of the Department of Physics in the University of Kansas.

The writer retains the 54.96-pound specimen for the Museum of the University of Kansas, the four others being now in the possession of Mr. George F. Kunz of New York City, who has also secured four of the five specimens obtained by Professor Cragin.

The total number of masses included in this fall was at least twenty. Two of them are in the possession of Professor N. H. Winchell of the University of Minnesota, and several have disappeared from view, either having been mislaid or being still in private hands. The total weight of all the masses must have exceeded two thousand pounds. They fell within an oval area about one mile in length.

The most remarkable point connected with the history of these meteorites is the fact that for five years they should have been known to so many citizens of Kiowa County before the attention of scientific men was directed to them. The wife of the farmer upon whose premises most of them were found persistently main-

tained that they would prove to be of some pecuniary value. This idea was, however, ridiculed by her relatives and neighbors; but she persisted in retaining control of most of the masses found upon the land pre-empted by her husband, until now the proceeds of this "iron from heaven" have cleared the farm from a heavy mortgage, and placed the family in comfortable circumstances.

These masses, during the period preceding their discovery by Kansas scientists, were put to a great variety of ignoble uses. One 75-pound specimen was used to keep in place the cover of a rain-barrel or the door of a cellar; another, weighing 350 pounds, served to hold down the roof of a stable; another, weight 210 pounds, was employed to secure the roof of a dug-out; another had been used with other common rocks to help fill up a hole under a barb wire fence through which the hogs had made their escape from their feeding-ground. This was the 35.72-pound specimen obtained on the writer's last visit, and was secured only after a long and anxious search.

Some of these specimens were only partially buried in the ground; others were struck by the breaking plough at a depth of from three to four inches; others at the second ploughing, five or six inches deep; others yet, by the stirring plough at the third ploughing in a subsequent season.

The specimen retained by the university weighed 54.96 pounds, or 24.93 kilos. It is an irregular plum-shaped mass, much pitted, and covered with a burned and weathered crust. Its extreme length is about eleven inches, and its breadth is seven inches. This specimen, as well as the others mentioned above, so far as examined by the writer, belongs to that class of meteoric iron known as "pallasite." It is composed of nickeliferous iron, including many cavities throughout the entire interior. These cavities are filled with troilite and a yellowish, glassy mineral, which is probably olivine. Some of the latter is very dark and less transparent.

The specific gravity, determined by Mr. E. C. Franklin, our assistant in chemistry, and obtained by weighing the whole mass, is 4.76. Two hundred and ninety-three grams have been removed from the larger end of the specimen, and a polished surface of about fifteen square inches has been obtained, which shows very well the structure. The Wiedmanstaeten figures, rather coarse in outline, were developed readily upon the polished iron surface by the application of nitric acid. The portion removed from the specimen is being used for analysis by Professor E. H. S. Bailey and Mr. E. C. Franklin, and the results of the analysis will appear later.

F. H. SNOW.

Lawrence, Kan., May 1.

Experiments with Cave-Air.

GRAND AVENUE CAVE is situated in Edmondson County, Ky., four miles from Mammoth Cave, on the Mammoth Cave Railway, and belongs to the system of great caves which are found in this section of the subcarboniferous limestone formation. Its extent has not been determined as yet, though from three to five miles are opened, showing a magnificent series of the grandest avenues to be found on the globe. The main avenue is about two miles long, and will average 40 feet wide and 30 feet high. This being the highest cave in this section makes it the driest in the rainiest seasons. The floors are covered with dust; but the absolute dryness of the air is best shown by a small house that was built in the cave some eighteen years ago, the wood, nails, lock, and hinges of which are as sound and bright as when first put in. A self-registering thermometer placed in the cave last November has registered 50° ever since, that being the unvarying temperature. Investigations looking to the use of this cool, dry, and pure air have been in progress for the past six months. A shaft 5 inches in diameter and 225 feet deep was sunk into the cave at a distance of 1,500 feet from its mouth, over which a small experimental building was placed. By means of a small Sturtevant exhaust fan, the air from the cave was brought into the room, and the temperature was reduced from 72° to 59° in less than an hour, thereby showing very clearly that with a large shaft, by which the friction would be greatly reduced, any quantity of this air can be distributed through a large building, thus placing it within the power of the owners to absolutely control the climatic conditions

of the house both as to temperature and moisture. The amount of air is inexhaustible, the quantity in sight being sufficient to fill 40,000 rooms 16×18×10 feet. The opinions of many prominent scientists have been obtained concerning the use of this air for sanitary purposes, a few of which are here given.

Major J. W. Powell, director of the United States Geological Survey, in speaking of the utilization of cave-air currents for regulating the temperature of buildings, says, "The phase of the problem in which you are specially interested is of so great practical importance as to demand not only a special but a general solution. It would afford me pleasure to either take up the general problem or assign it to some competent authority for investigation, were the data adequate; but there are not accessible in this office a sufficient number of records concerning air-movements at natural openings of caverns to render the investigation useful; and, moreover, a final solution could not be reached without consideration of just such data as you are to seek,—data which are not now available. In response to your request to make suggestions concerning methods to be pursued and results to be expected, I can say but little. Indeed, I hope that you will soon be in a position to convey information to me and to the world at large upon the subject."

Dr. Billings of the Surgeon-General's Office, Washington, D. C., after making several suggestions, says, "Hoping that these suggestions will be useful to you, and assuring you that if the experiments indicated are properly carried out they will give some very interesting and valuable information, I remain yours sincerely," etc.

Dr. Henry O. Marcy, Boston, Mass., after consulting Dr. H. I. Bowditch, says, "Such air must be of the highest value for respiratory use in diseased organs. Of course, sunshine is important, and this is the chief drawback to establishing the sanitarium within the cave. To drive it by means of a fan through a house would certainly seem of much value. An aseptic atmosphere is the gain from the long sea-voyage or living on mountains or in wooded districts. Here we ever have fluctuations in temperature, and other conditions, beside moisture. It has recently been considered as of practical importance to furnish air to a great city, as London, from high towers: why not, and much easier for many reasons, from caves? The air freed from bacteria is, as you are well aware, one of the secrets of success in modern surgery."

Burton, in his "Anatomy of Melancholy," under the head of "Air Rectified" (p. 306), says, "In some parts of Italy they have wind-mills to draw a cooling air out of hollow caves, and disperse the same through all the chambers of the palaces, to refresh them, as at Castoga, the house of Cæsareo Trento, a gentleman of Vicenza, and elsewhere."

The only modern instance with which I am acquainted is the hall of the Palace of the Trocadéro, in Paris. This building is erected over a portion of the old stone quarries. In the course of construction all the openings were closed, with a few exceptions. When it was found that a strong, cool current came from the underground chambers, all the openings save one were closed. This one was walled up to keep out the surface water, and shrubbery was planted around it. The chambers were carefully cleansed and dried, and the air is permitted to enter through this opening, which is never closed. The old quarries act as an immense cooling chamber. Mr. C. H. Blackall, in a letter, says, "At the rear of the stage, on the left, is a large room, the floor of which is only a little below that of the auditorium, and at its lowest point. In this room are the fans which draw the cool air from the quarries through a large opening in the floor, and force it either directly to the hall, as in summer-time, or first to a heating-chamber, where the air is warmed by passing over heated pipes. The fans, air-ducts, etc., are so placed that the fresh air may be introduced at the top of the hall, and foul air drawn out at the bottom, or *vice versa*. The air ascends, or rather is forced up, a large brick shaft behind the stage, and carried across to the centre opening of the dome through galvanized iron ducts about 5×8 feet.

The architect of the palace, after saying that nothing has been printed on the subject, writes thus: "I have the honor to inform you that the hall of the Trocadéro has a capacity of about 1,620,-

000 cubic feet; that ventilation, which furnishes 3,240,000 cubic feet per hour, is obtained by means of two engines, each of 15-horse power, operating two inhaling and two exhaling ventilators (one of each kind for each half of the hall). These ventilators are perfectly alike, they are about 8.4 feet in diameter, and consist of helices of a thickness of half an inch, with eight wings at an inclination of forty-five degrees. The engines are horizontal stationary ones, with two cylinders on the principle of restraint and condensation. Two boilers furnish the steam. Each of these has a heating surface of about 189 square feet, and a capacity of 54 cubic feet. They are gauged to a pressure of 10 pounds. The entire machinery has given excellent results. One may say it works too well, inasmuch as under full power there is a great excess of air. Usually only one-fourth of the total possible power is applied, and this is very amply sufficient."

Taking into consideration the unlimited supply of pure, cool, and, as far as investigations go, aseptic air, together with high altitude (nearly 900 feet above sea-level), its situation in the midst of a virgin forest of oak and hickory, with a sandy soil (resulting from the wear of the Chester sandstone) and splendid drainage—indeed, every thing seems to conspire to make this a favored spot for sanitary purposes.

M. H. CRUMP.

Frankfort, Ky., May 3.

Sunspots, Tornadoes, and Magnetic Storms.

IN my letter regarding sunspots and tornadoes, printed in *Science* on May 2, 1890, reference was made to magnetic storms observed at Toronto near the maximum stage of the last sunspot cycle. From that memorandum, by a clerical error, were omitted the words "September, 1883," after "November, 1883."

JAMES P. HALL.

Brooklyn, N. Y., May 3.

Gorse or Furze

EUROPEAN furze grows in one spot in the island of Nantucket, where it has maintained itself for fifty years. It was introduced by an Irishman, who was homesick because it did not grow about his cabin, as in the Old Country. I have never seen the plant growing, but have seen branches gathered from it. I believe it has not spread to any great extent. It may be interesting to some that the Scotch heath also is found in one spot in the island, where it has continued for a long time.

GEO. W. PERRY.

Rutland, Vt., May 5.

YOUR correspondent, Mr. J. R. McGinnis, may be interested to learn that the gorse or furze (*Ulex Europæus*) has for many years been fully naturalized in the southern part of Vancouver Island, where, along roadsides and in waste places in the vicinity of Victoria, it is very common. The broom (*Sarothamnus Scoparices*), is also abundant in similar situations in the same locality, and both plants appear to be as much at home as in their native soil.

GEORGE M. DAWSON.

Geological Survey of Canada, May 5.

BOOK-REVIEWS.

Stanley's Emin Pasha Expedition. By A. J. WAUTERS. Philadelphia, Lippincott. 12°. \$2.

IF any one besides the great explorer himself is able to describe the progress of Stanley's eventful journey, which led to the complete overthrow of European influence in Equatorial Africa and to the return of the indefatigable Emin Pasha, it is Mr. Wauters, who has closely watched the progress of the expedition from the beginning to the end, and, being closely connected with the Belgian enterprises on the Kongo, had access to all the material bearing on the expedition. The author begins his graphic descriptions with a history of the conquest of the Soudan and the revolt of the Mahdi, which was the immediate cause of the difficulties with which the governor of the Equatorial Province was beset. The first half of the book is taken up by descriptions of the state of affairs in the Soudan, Dr. Junker's important expeditions and his