Correspondence.

Sweet Milk Diet.

To the Editor of the SCIENTIFIC AMERICAN:

In the SCIENTIFIC AMERICAN of March 2 I read a letter from Clay Harpold relative to a sweet milk diet. He cites several cases of stomach trouble or dyspepsia aggravated by the use of sweet milk which could not be cured until the use of sweet milk was discontinued. For a great many years I have been troubled with dyspepsia or indigestion. I tried several doctors and various patent medicines without relief. I was troubled the most at night; in the daytime not as much. I reasoned that the erect position in the daytime allowed the gases generated in the stomach to escape. If I went to bed without supper, I was not distressed in the least. One evening I made my supper of bread and milk, and I rested as comfortably as if I had eaten nothing. This was a hint which I took. For about four months I have eaten bread and milk at the evening meal without feeling any return of the trouble. Two or three times I have eaten other food as an experiment, and in each case I have been distressed more or less, according to the amount that I had eaten. THOMAS RYAN.

Lockport, N. Y., March 11, 1907.

Spike Fastenings on Railroad Curves.

To the Editor of the SCIENTIFIC AMERICAN:

In regard to your observations of the New York Central wreck in your issue of March 2, I would like to add a few remarks to the practical side of the question.

In a conversation held with a track foreman who has been for thirty-four years in the employ of the Chicago and Northwestern Railway on their double-track system, he stated that he had taken spikes out on curves *that were nearly worn through* where the base of the rail bears on them; also, that spikes wear more when a rail is placed on a tie plate than when placed directly on the wood. Supposedly a rail placed directly on the wood gives the rail more spring, and the wear covers a larger surface on the spikes.

This foreman said that he used his best oak ties on a curve, and a brace made especially for this purpose by the Chicago and Northwestern Railway, for the sharper curves. This brace fits under the head of the rail, and flares out and is held by three spikes at the outer end.

If the spikes were worn as herein stated in the New York Central wreck, we can readily see why the tests were held afterward (with new spikes) with safety at a speed of 82 miles an hour without any further elevation or alignment of the track.

The position of the center of gravity in the electric motors and the elevation of the outer rail are very good considered scientifically, but do not overlook the spike, the only thing that keeps the rail in its place.

Rockford, Ill., March 11, 1907. L. H. LUTHER.

An Opinion on the Transmission of Life from Star to Star and on Leduc's Artificial Plants.

To the Editor of the SCIENTIFIC AMERICAN:

The letter from C. W. Bennett on the "Transmission of Life from Star to Star" brings up the subject of inorganic cosmical and biological evolution. According to Lockyer and others, very hot bodies are extremely simple in their composition. In the hottest stars like Zeta Puppis, in the constellation of Argus, the spectroscope shows that the elements are few, and most of them in a dissociated or proto form. The most prominent element is hydrogen and proto-hydrogen. The less prominent elements are helium, proto-magnesium, and proto-calcium. In cooler stars, metallic elements appear and the number of elements greatly increase. Since the hotter stars contain fewer elements, it is logical to assume that if the temperature of a star were sufficiently high all elements would be dissociated and all matter reduced to the corpuscular form.

As we descend from the hottest stars down to the coolest visible stars the elements increase in number, but all visible fixed stars are above that critical temperature where chemical action is possible and the elements are therefore uncombined. It is only in colder bodies like the earth that there is the complexity of matter due to chemical combinations, where organic life is possible.

Prof. Arrhenius's theory of the pressure of light seems to be pretty generally established. Accepting the theory that the earth and all the planets are subjected to constant bombardment of corpuscles from the sun and stars, I cannot see how germs of cellular life can be conveyed by them through interstellar space, since that space is but little above absolute zero, a temperature that would destroy all life germs of which we know anything.

The article by Dr. Gradenwitz on "Artificial Plants and Cells" recalls an article which appeared in the Revue Scientifique, Paris, two or three years ago, which ascribed to crystals a certain kind of life. The theory was based on phenomena observed under the microscope during the growth of crystals from a solution. A salt was dissolved until the liquid was saturated; by lowering the temperature a series of very complicated vital phenomena appeared. The crystals could move about and possessed the peculiarity of being able to reproduce themselves, by division, gemination, and endogeny. The struggle for existence went on. When two crystals met the weaker would be absorbed by the stronger. They appeared to be alive.

Von Schron discovered that crystals had diseases, some of which were hereditary. The author proposed the formula, *Omne vivum ex molecula* (all life from the molecule). He ascribed to crystals real spontaneous generation. The growth of Leduc's artificial plants appears to be a confirmation of the theory of molecular life. Perhaps in time we may go a little farther and say, "All life from the corpuscle."

JOHN CANDEE DEAN.

Indianapolis, Ind., March 24.

An Artificial Geyser.

To the Editor of the SCIENTIFIC AMERICAN:

The illustration and description of the hydraulic air compression plant in your issue of the 16th prompts me to describe what proved to be an artificial geyser, which was accidentally produced in this city about two years ago.

This section is underlaid by an extensive deposit of soft limestone, which is permeated with fissures, cavities, and underground streams; and the "lime sinks," caused by the caving in of a cavern, are easily drained of the water they usually hold by boring a hole in them to the cavities below. It was necessary to drain a low place in the city, which, after heavy rains, formed a pond of about half an acre area with a depth of about 18 inches. An 8-inch hole was drilled at the edge of the pond, the water being dammed back, and at a depth of ninety feet the drill dropped into a cavity some six or eight feet in depth.

The drill was then withdrawn, the dam opened and the water allowed to enter, which it did with a rapid, whirling motion, not completely filling the pipe. In a few moments the hole began to fill up, violent ebullition began, and the column of water and spray was violently shot up in the air to a height of about 40 feet.

I was on the spot a few minutes after the first discharge and took notes of the action of the well. In six minutes after the first discharge, the well filling again, the discharge was repeated, and the action was continued at intervals of six to ten minutes for half an hour, when, the pond level having been lowered, the intervals became longer and the discharges less violent, and finally ceased with the draining off of all the water. My explanation of the phenomenon was, that the drill had entered one side of a domed cavity having an outlet near the bottom, which outlet was too small to carry off the volume of water entering, and the air carried down by the water was, of course, compressed in the chamber until its high pressure forced out the column of water in the pipe. With very heavy rains furnishing a sufficient volume of water, the action is repeated. C. W. TIFT.

Albany, Ga., March 18, 1907.

The Orbit of the Sun and the Solar System.

To the Editor of the SCIENTIFIC AMERICAN:

In the issue of February 9 of the SCIENTIFIC AMERICAN, J. D. W. C. (Inquiry 10374) asks concerning the probable length in earth years of the orbit of the solar system. I have before me an article by Richard H. Byrd which, I think, answers this question very completely. I quote from the article as follows:

"Our sun through the centuries travels a long ellipse, dragging the world, of course, with it, and just within one end of this ellipse blaze the rays of another sun, known to astronomers as the star Arcturus. At the other end of our sun's ellipse are cold voids, vast spaces of absolute zero.

"Astronomical records are complete enough to show that somewhere more than twenty centuries ago Arcturus was visible only as a luminous speck. Now it blazes in the evening sky, bright as the planet Jupiter, a beacon among the glittering points of fire that stud the firmament this side the Milky Way. Manifestly, our own solar system is approaching the sun Arcturus.

"The rate of travel of our sun through space, carrying with it its little group of satellites, including the world, has been determined with fair accuracy. We are racing southward through the heavens at the rate of about 5,000,000 miles a year, along an arc whose segment shows undeviating progress in the one direction of Arcturus. Eventually, we will be carried clear around this star and be subjected to its fierce rays; then we will come back on the other side of the ellipse, and will be carried along a wide and awful sweep toward the star Polaris, now in our rear, and to the extreme curve that must be passed before the journey back again begins. How many times our solar system has swung that almost illimitable course, none can ever know or guess. But in this great course there are just two extremes of season, except that instead of their being six months, they are about 75,000 years apart. The summer season of this vast cycle is unutterable heat—the melting point; the winter season, frigidity. That we are now a little more than half way down the journey to the summer turning point, and entering upon a spring-like opening to a young summer of celestial weather, is made clear by those whose study is the sky, and to whom the stars present but partial mystery.

"The astronomer Leroy Tobey has shown that the course we are traveling is regulated by the influence of Arcturus, and that it will carry us around that torrid star in something more than 25,000 years. The turn will bring us so near to it, and into a zone of heat so high, that physical life in its present form will be impossible; for Arcturus is an incandescent sun, known to be vastly larger than our own. The belief that the world shall die in fire enwrapped a truth —as all beliefs do when they are understood.

"On the other hand, at the Polaris end of the great ellipse are 'thrilling regions of thick-ribbed ice.' Flung to the extreme limit of its course, before it turns again in answer to the magnet of its orbit, our sun and the worlds that circle it, being farthest from their source of heat, will dim and fall into a sleep of cold so deep that life will be suspended, to again awaken and again begin a new development, as the southward turn is made and warmth flows in once more."

This is only a partial quotation from the article referred to, which appeared in a local publication, but I think is sufficient to answer the inquiry of your correspondent. I do not know where the article first appeared. ELMER E. TOWLE.

Richmond, Ind., February 18, 1907.

Peary's New Polar Projects.

The Navy Department at Washington has granted another three years' leave of absence to Commander Robert E. Peary, the Arctic explorer, and this added to the fact that orders have been given to hurry along the repair work on the polar ship "Roosevelt," renders it not unlikely that he will have another expedition ready to sail for the north pole by June 10. It is known that he is anxious to get away about that date.

Commander Peary stated in his lectures that if he ever started again to reach the pole he would take a course more to the westward from the last starting point, a thing he learned on his last trip.

There were only two obstacles that he encountered in his plans to try again to reach the goal of his ambition. One of these was the raising of funds to pay the expenses of the expedition, and the other was the necessity of obtaining a leave of absence from the Navy Department. A few days ago the announcement was made that Commander Peary had received a guarantee of $200,000 for a new expedition.

The other obstacle was overcome when the Navy Department granted the three years' leave of absence.

The Current Supplement.

The current SUPPLEMENT, No. 1633, opens with an excellent article by G. K. Gilbert on the rate of recession of Niagara Falls. A series of pictures made at intervals from 1827 to 1895 show how rapid has been the erosive work of the great cataract, and how the shape of the Falls has changed year by year. The induction coil, however small, should be provided with a switch for making and breaking the primary circuit, and as it is often desirable to change the direction of the current through the inductor, as the primary winding is called, a reversing commutator can be employed to advantage. How such a reversing commutator may readily be constructed at home by the experimental amateur is clearly told by Mr. A. Frederick Collins. Working drawings accompany the text. Dr. Frederick H. Millener contributes a discussion of the pernicious effects of alternating current of high voltage. Mr. Taylor's splendid article on the chemical composition of tool steel is concluded. How coke is made is told very lucidly in an authoritative article. Prof. A. Durig writes on alcohol and mountain climbing. The gigantic increase in the erection of skyscrapers in lower Broadway, New York city, has been made in the face of grave and increasing engineering difficulties which concern chiefly foundation problems. These are excellently discussed by Mr. C. M. Ripley. Mr. J. Percy Moore traces the evolution of the elephant.

Repulse of Balloons by Coast-Defense Batteries.

The German military authorities have been conducting a series of interesting experiments at the Heubude coast-defense battery, Danzig Bay, with the object of determining the efficiency of modern ordnance in repelling captive and free balloons. The battery was equipped with 10-centimeter guns and mortars. Shrapnel was the ammunition used. Floating at a height that varied between 18,000 and 25,000 feet, balloons of 100 cubic meters capacity were quite easily brought down. Only one balloon escaped inland.