Correspondence.

Home Refrigerating Plant Wanted.

To the Editor of the SCIENTIFIC AMERICAN:

I noticed recently in the SCIENTIFIC AMERICAN an inquiry for a small ice or cold-storage plant, for dwellings or other isolated places, where a small cold-producing plant would be of great use.

I have often thought that windmills might be used for compressing air in reservoirs, just as they are used for pumping water into elevated tanks, and that after cooling the air it might be used for refrigeration.

I have understood that this method of refrigeration was not economical, or that the efficiency was low, but have never seen any figures on the subject. It would be interesting to have an article from your Mr. Alton D. Adams on this subject, written in his usual thorough manner.

I think the mechanical arrangements could be made without much difficulty, but whether the mechanism would accomplish the desired result economically is the problem on which reliable information would be welcome. These windmill refrigeration plants would be of immense benefit in cooling rooms for the storage of perishable stuff, the manufacture of ice being really a secondary matter to most persons.

I hope that you will be able to give us some articles in the SCIENTIFIC AMERICAN on the subject of refrigeration and the means of accomplishing it on a small and comparatively cheap scale. STANLEY PIKE.

Greenfield, Ohio, October 2, 1901.

[We shall be pleased to hear from any of our correspondents, who may have made experiments in this direction.—ED.]

The Great Shower of Shooting Stars.

To the Editor of the SCIENTIFIC AMERICAN:

This wonderful display, which startled the northern hemisphere in the month of November of the years 1799, 1833 and 1867, was announced by some English astronomers as due to reappear in November, 1899. But the watchers were disappointed; and the cause assigned for this disappointment was that the swarm of meteors from which the shower falls had been either diverted from its usual source, or had been wholly scattered by the influence of some of the large planets. The probability is, however, that we shall behold this grand display again, about November 15, 1901. One of our leading astronomical publications, referring to this subject, uses the following language:

"Some astronomers have expressed opinions with more or less assurance that the path of the Leonid streams of meteors has been so changed that we may no longer hope for such grand showers as were seen in 1866, and notably in 1833. Although no remarkable shower is reported as seen anywhere in 1900, it is evident that the stream of Leonids has not been diverted from its former course far enough to miss the earth;" considerable numbers of the Leonids having been seen at various points on the night of November 15, 1900.

The explanation of the mistaken prediction is to be found in the hasty and careless examination made of the records of past appearances of these meteors, and which ended in the deduction of a period of thirty-three and a quarter years. Prof. McClune, of Philadelphia, however, with Prof. Herrick, of Yale, and a few others correctly estimated the period in 1867, putting it at 34 years and 1 day, or to be more accurate 12,419 days. Thus, the first recorded shower was witnessed on the night of November 11-12, 1799; the next on that of November 12-13, 1833; the following one occurring on November 13-14, 1867; so that the next becomes due on the night of November 14-15, 1901—in a few weeks hence.

It has been found that this stream of meteors takes three years to pass the point where the earth meets it in each November of those three years to plunge through it in five or six hours. The first year of these encounters the head of the stream is met, where the swarm is thin and the display consequently not so great as that of the second year when the earth goes through the dense portion, to be followed in the third year by a still lighter shower. The records show that the displays of the first year have been visible in the Eastern Hemisphere, but not on this continent, whereas the reverse has been the case with those of the second years—or the great showers, so called. As the display of the first year 1866 series was quite brilliant—seen only, however, in the Old World—the 33 years that had elapsed from the grand shower of 1833 seem to have been taken as the period of return; and this no doubt led to the mistaken prediction which assigned 1899 for the reappearance of this magnificent sight. But the shower of 1867 was by far the grandest of that time, or rather series. And reckoning from the previous corresponding display, 1833, the period was exactly 34 years and 1 day, as stated already. The same reckoning holds good in the preceding cases.

A notable circumstance in connection with the visits of the Leonid meteors is that the weather of the Northern Hemisphere has experienced remarkable vicissitudes at each of the recurring periods. The sudden and violent change in the temperature (observed in 1799 by United States Commissioner Ellicott, off the coast of Florida) was noted again in 1833, the thermometer having run down 20 deg. in this vicinity (at other points as much as 30 deg.) from a few hours before the appearance of the meteors until sunrise of the 13th of November. And the fall in the temperature continued until the 21st, at which time the daily mean had fallen from 54 deg. on the 12th to 27 deg. A similar perturbation occurred in 1867; and if a rapid decline should occur within a few hours after sunset on the evening of November 14 next it will probably indicate the close proximity of the earth to the approaching meteoric swarm.

So, too, the rainy character of those years is remarkable. No records on this score are obtainable for 1799. But in 1833, in this vicinity generally, the rainfall was in excess of from 4 to 7 inches above the mean of a quarter-century. The summer of 1867 was noted for its heavy, incessant rains: there fell in the month of June 10.33 inches, and in July 6 inches, or an aggregate for the first seven months of the year of 30.05 inches—the annual average being about 43 inches. The month of August was an unusually rainy one, a single downpour in the middle of that month having lasted 42 hours, with but a few hours of abatement. September and October were pleasant, but November and December, with their rain and snow, carried the year's record to about 57 inches, the highest ever known in this vicinity. The year 1867 was also, like the other periodic years, remarkable for snows and thunderstorms out of season and other phenomena of an extraordinary character. In the first week of November great tornadoes occurred in the West Indies, violent gales on our Great Lakes, and a remarkable thunderstorm in Montreal; while in this vicinity the thermometer dropped, on the morning of the 7th, to 30 deg. and immediately began to run up again until it reached 57 deg. shortly after midnight. On November 11 the day at Washington, D. C., was unusually warm, ending in a violent thunderstorm at night, followed immediately by a very high and cold wind and at noon a fall of snow.

The present year, 1901, has been just such a rainy one as those which have heretofore marked the Leonid periods. At the end of last August the rain and snowfall footed up for this vicinity about 36.4 inches, or about 6 inches more than the average of the first eight months during a period of 32 years. The extraordinary phenomena noted this year are precisely those which characterized the previous periodical years. So that there seems sufficient reason to look forward with confidence to a reappearance of the great Leonid shower this fall. A remarkable circumstance was noted at Kinderhook, N. Y., on the 11th of November, 1833, two days before the great shower. Phosphorescent lights were seen on the tops of sticks, posts and other pointed objects, some of those lights being as large as the flame of a candle, and having a dim white light pointing upward. At the same time the atmosphere appeared unusually red. This and many other phenomena that especially characterized the periodic years lead not unreasonably to the conjecture that the passage of meteoric swarms and of comets, either close to or into the earth's orbit, affects seriously the atmosphere, the temperature and the weather of our planet. F. MACBENNETT.

Long Island City, N. Y.

Stuttgart Gives an Ichthyosaurus.

The American Museum of Natural History has just received as a gift from the Museum of Stuttgart, Würtemberg, a perfectly preserved example of the species *Ichthyosaurus quadricissus*. It comes through Prof. Eberhard Fraas, who made a long tour of exploration in the fossil beds of the Rocky Mountain region with Prof. Osborn last spring. The fossil is from Jurassic of Holsmaden, a little town not far from Stuttgart, which is famous for its ichthyosaur quarry.

The specimen, says The Evening Post, is on a slab 9 feet 3 inches in length, by 2 feet 5 inches in breadth, and is perfectly preserved. Ichthyosaurs have been found in abundance, both in Germany and England, but what renders this fossil unique is the fact that it contains seven young animals within the body cavity of the mother, thus giving a demonstration of the fact that ichthyosaurs were viviparous, bringing forth their young alive. These young animals are surprisingly large, the heads measuring 9½ inches; the backbone and paddles are well developed, and prove that the young were abundantly able to take care of themselves, and to swim immediately after birth. The ancestors of the ichthyosaur undoubtedly lived on the land, and were oviparous; but as they became more and more seafaring in habit there was a gradual retention of the young in the abdominal cavity to a later and later period of development, until finally, like some of the sharks and snakes, they became completely viviparous.

The external form of the ichthyosaurs, as partly prophesied by the English anatomist, Richard Owen, has been realized in the Holzmade quarry by the discovery of four or five specimens in which the integument is preserved. In general, it is smooth, and resembles that of the dolphin, but it is so excessively thin that it has to be worked out with the utmost delicacy with a fine scalpel under a lens. Very few of these perfect specimens have been discovered. One is in Stuttgart, another in Berlin, and the third and finest of all in Budapest. Through the kindness of Prof. Fraas, the museum has secured the promise that the next ichthyosaur showing the fins and integument will come here for exhibition upon what will be known as the "ichthyosaur panel" of the marine reptile corridor. American ichthyosaurs are very rare, but the explorers for the museum two years ago secured one fine specimen in the Como region of Wyoming, along the line of the Union Pacific Railroad, which will soon be worked out and placed with its European relatives. It represents the last of the race, in which the swimming paddles are very much modified and the teeth have almost disappeared. This genus was called Baptanodon by Prof. Marsh.

Science Notes.

According to experiments made by A. Nabokich, chiefly on *Zea mays*, the growth of the higher plants does not, in most cases, cease when they are entirely deprived of oxygen, nor do they become altogether insensitive to external irritations. The formation of chlorophyl is, however, entirely suspended, even in the light. It is probable that some seeds can germinate without oxygen, but this does not appear to be the case with the spores of fungi.—Ber. Deutsch. Bot. Gesell. 29, 222.

Prof. Hartog, of Cork, has discovered that the movement of the frog's tongue is not the result of direct muscular action, but to the injection of lymph into the bag-like tongue. Ordinarily the tongue lies with its tip in the throat, and when the frog darts it out it is doubled forward with lightning rapidity and returned with as great celerity to its normal position. The professor, to illustrate his discovery more comprehensively, has constructed a small model in which the movements are shown.

The date for the Archæological Congress has been fixed for April, 1903, at Athens. This decision is probably influenced by the current belief that the Olympian games will also be held there about the same time. The Congress will convene for fifteen days, the first five of which will be given to discussions in convention and the last ten to excursions among the various places of archæological interest in Greece. The subjects for general discussion have not yet been made public. Invitations will be extended to universities and colleges and to the heads of governments.

A factory has been started near Aix-la-Chapelle for the manufacture of cotton to resemble silk by a new process. It is a distinct improvement upon the old "mercerized cotton," while another important consideration is the extreme simplicity of the invention. Four hundred hands are to be employed, but as skilled labor is unnecessary, the major part of the employes will be boys and girls, which will considerably cheapen the cost of production. The silk produced by this process is extremely brilliant in color and finish and possesses great textile strength. The thread consists of ten or twenty fibers twisted into one, but it can also be made of any thickness that may be desired. A thread known as "horsehair artificial silk" may also be produced. This cotton silk is 40 per cent cheaper than the real article. The patent manufacturing rights have been disposed of in France by the inventor for $300,000.

In German sugar refineries molasses is being used in the preparation of food for cattle. According to information furnished to the Société d'Agriculture, and translated for The Literary Digest, the molasses is first "heated to 90 deg. and then introduced in a steady stream into a mechanical mixer. At the same time the forage with which the molasses is to be incorporated is also fed into the machine. There issues from the mixture a warm, moist, coarse-grained mass, which is left in a pile for several hours with certain precautions. In a short time there is thus obtained a homogeneous dry product that can be easily transported and preserved. The materials employed are of many kinds, including wheat, chaff, cut straw, turf, sesame, peanuts, rice, corn, etc. According to their nature these are previously crushed, ground or flattened by machines similar to those used on farms. The whole plant for the preparation of the food, except the boiler for working the molasses pump and the vats for heating the molasses, are placed in a corner of the refinery. It occupies little space and can be quickly taken down and removed. The expense is slight, and the production is 30,000 to 40,000 kilogrammes (33 to 44 tons) of forage daily."