

## Correspondence.

## The Vacuum Process of Preserving.

To the Editor of the SCIENTIFIC AMERICAN:

Referring to the article on the "Vacuum Process of Preserving," in your issue of September 8, I take pleasure in giving you below the answers to the questions in this article and have added other information, which may be of interest to your readers:

1. Yes.
2. Vacuum pressure will not destroy bacteria.
3. The degree of heat required to destroy bacteria varies in every variety of fruit or vegetables.
4. Yes; temperature to destroy bacteria varies according to article to be preserved. This process is used in canneries, but it spoils the fine flavor of the article, and is the reason why canned fruit is inferior to the article put up in homes. Fruit to retain its fine flavor should never be cooked twice.
5. Yes.
6. No.
7. We do not know the source of life of germs; the source of life of anything has not yet been discovered.
8. It is difficult to classify them, as there is such a great variety of germs.
9. None will be destroyed.
10. No.
11. Probably same length of time and same degree of heat.
12. There is no such thing as an absolute vacuum; it has never been obtained with pumps or other scientific apparatus.
13. I do not know the exact degree of vacuum which has been obtained so far.
14. They would not necessarily keep.
15. No.
16. No; its action is not suspended.
17. Perhaps not indefinitely, but enough to spoil the food.

Your correspondent has evidently been under the impression, which is shared by some canners, that a vacuum will destroy germs. To fully understand the vacuum process of canning, we must distinguish between the bacteria floating in the air and those contained in the food itself.

Every process of canning in vogue so far, even with the old style Mason jar, is to some extent vacuum canning. The difficulty in opening Mason jars is caused by the vacuum which was formed at the time the food was put up.

Fruit and vegetables will begin to ferment almost immediately after they have been picked or taken from the soil. Tomatoes will ferment quicker than other fruits or vegetables, and this is the reason why a great many people experience difficulty in preserving same; while they are apparently fresh, fermentation has progressed already so far that only cooking for a very long time will destroy the fermentation.

To put up fruit in canneries in glass jars and to retain its best flavor, the bacteria in the fruit and those floating in the air should be destroyed at the same time, so as to avoid cooking the fruit twice. This can be done by fastening the cover to a jar partially, that is, so that part of the air and the steam can escape, but the greater part of the steam rising from the fruit will come in contact with the cover and by condensation drop back into the fruit.

When the fruit is cooked sufficiently, the cover should be fastened quickly, and upon the jar cooling off a vacuum will be formed.

In addition to this, there is the air which is contained in the fruit itself, which also becomes rarefied during the process of cooking. This rarefied air rises to the top when the jar is cooling and to some extent helps to preserve the fruit. This is most noticeable in preserving apples. A quart jar, which was filled brimful with apples, showed on cooling a shrinkage to one inch from the top, this being caused by the rarefied air leaving the fruit and rising to the top.

Chicago, Ill.

RICHARD MURR.

## Sun-Spots and Earthquakes.

To the Editor of the SCIENTIFIC AMERICAN:

I see by a dispatch in the daily press that the earthquake in Chile on August 16 was foretold by astronomers there, who based their predictions on the conjunction of Jupiter, the earth, and the moon. The prediction was published in the newspapers there on the day before the catastrophe. Another dispatch from London states that Sir Joseph Lockyer, director of the Solar Physics Observatory, Kensington, says it is a remarkable fact that "the earthquakes in San Francisco and Valparaiso synchronized with a sun-spot maximum, and that in 1894, when there were many serious earthquakes, the same conditions obtained," suggesting that the point is well worthy of investigation.

You published three communications of mine four years ago—on June 21, July 26, and September 27, 1902—upholding these theories that volcanic and seismic actions are partly caused by planetary positions

and also by sun-spots; so then let us see how the recent big earthquakes coincide with certain planetary aspects, for it is at least remarkable, whether we admit a cause and effect relation or not.

A very close conjunction of Saturn and the moon with the earth, amounting to nearly an occultation, took place at 2:45 A. M. of April 19 last. The big earthquake that visited San Francisco—and also this place, which is 30 miles distant—and was the severest ever known here, took place at 5:13 A. M. of the 18th, some twenty-two hours before.

There was a conjunction of Jupiter and the moon on August 15 at 1 P. M., and a close conjunction of Mars and Mercury on August 17 at 12 M. The earthquake in Chile came at 7:52 P. M. of August 16, about midway between the two influences, the first shock lasting 4½ minutes and the second 2 minutes, and several hundred more were felt during the following few days, continuing through the conjunctions of Mercury and the moon and Mars and the moon on the 18th, full moon and eclipse on the 19th, and moon on the equator on the 21st.

I wish to call your especial attention to the planetary positions of September 2 to 5, for if there is any truth in this theory of the cause of seismic and volcanic disturbances, they should surely be at a maximum at that period. On September 2 we have full moon at 3 P. M., and the occultation of Saturn by the moon at 7 P. M.; on September 4 Mercury is in perihelion at 7 A. M.; a very close conjunction of Mars and Mercury occurs at 6 P. M., with Mars only 9 min. north, and the opposition of the great planet Saturn with the earth and sun takes place at 7 P. M. Seismic, volcanic, and electric disturbances of many kinds may be expected on and near these dates; also at new moon, moon on equator and perigee, on September 18, 19, and 21 respectively, and at the occultation again of Saturn by the moon on the 29th at 11 P. M.

We are also near the earth's and Saturn's equinoxes, both coming at nearly the same time; hence the unprecedented seismic unrest. A dispatch from Berlin of August 30 says: "The weekly earthquake report of the Geophysical Institute of Goettingen University shows that there were eight earthquakes last week and twenty the previous week. These figures are the highest ever recorded."

Whenever three or more members of the solar system come nearly or directly in line with each other, or one crosses the plane of another's equator, more especially if unusually near to each other, as in close conjunctions and oppositions, equinoxes, perihelions, and perigees of the seven planets, moon, and sun, electrical disturbances seem to be caused throughout the solar system. As to how this occurs, the following theory may account for it: There is probably a perpetual interchange of electrical energy between each two members of the solar system—to maintain an electrical equilibrium, as it were. (We know that sun-spot disturbances are communicated to the earth with the speed of light, causing magnetic aberration.) Now, electricity travels, of course, along the line of least resistance, but as in space the resistance is uniform, electricity travels between planets by the shortest distance—a straight line. Then, when three or more planets come in line with each other or the sun, there would be more interchanging of electricity than usual, and the nearer to each other, of course the more so. One planet might have at times more positive than negative electricity, and others *vice versa*, or more of both than another planet, and an equilibrium would be set up by mutual exchange when they came in line. Also, electricity may be supposed to be thrown off from a planet in all directions along the plane of its equator, hence when this plane intersects another planet we have electrical interchange and unrest. All of which reminds us that what we do not know about electricity and its behavior under certain conditions would "fill a big book," as the saying goes.

The theory of planetary causes of electrical disturbances is by no means new or original, as will be seen by the following extracts from a work on "The Sun" by C. A. Young, Professor of Astronomy in the University of New Jersey, published in 1881:

"There is no question of solar physics more interesting or important than that which concerns the cause of this periodicity [of sun-spots], but a satisfactory solution remains to be found. It has been supposed by astronomers of very great authority that the action of the planets in some way produces it. Jupiter, Venus, and Mercury have been especially suspected of complicity in the matter, the first on account of his enormous mass, the others on account of their proximity. De la Rue and Stewart deduce from their photographic observations of sun-spots, between 1862 and 1866, a series of numbers which strongly tend to prove that, when two of the powerful planets are nearly in line as seen from the sun, then the spotted area is much increased. They have investigated especially the combined effect of Mercury and Venus, Jupiter and Venus, and Jupiter and Mercury, as also the effect of Mercury's approach to, and recession

from, the sun. In all four cases there seems to be a somewhat regular progression of numbers, though much less decided in the third and fourth than in the first and second. Loomis suggests that the conjunctions and oppositions of Jupiter and Saturn may be at the bottom of the matter."

In your article on "A Severe Earthquake in South America" in issue of August 25, you mention three other severe earthquakes occurring there recently—the dates being March 27, April 24, and May 5. On referring to the almanac I find: March 27, 7 A. M., conjunction of Mars and moon; March 28, 2 A. M., conjunction of Mercury and Venus; April 23, 9 A. M., new moon; April 24, 7 P. M., conjunction of Venus and moon; April 25, 8 A. M., conjunction of Mars and moon; May 5, moon on equator; May 6, 6 A. M., conjunction of Venus and Mars, Mars north 5 min. There are thus seen to be in the first case two earthquake causes but nineteen hours apart; in the second, three causes in less than forty-eight hours, and in the third, two strong causes in thirty hours, including a very close conjunction. There are but three other dates in March—12, 13, and 25—when the earthquake-planetary causes are so strong; four in April—8, 9, 10, and 18; and three in May—17, 23, and 24.

I would like to see this theory of planetary causes fully worked out and tested, by considering not only the conjunctions and oppositions as seen from the earth, but all lining up of the planets with each other or the sun, and also the equinoxes of the planets and principal satellites. A means of accurately predicting sun-spots, earthquakes, volcanic eruptions, and electrical disturbances in general might be developed.

Livermore, Cal.

ELMER G. STILL.

## A Motor Vehicle Test.

Plans for a commercial motor vehicle test have been made by the Automobile Club of America. The contest, which will be an economy test, will be held from November 7 to 10, the competing machines being subjected to different tests on each of these four days.

The competing cars will probably not be divided into classes, but will conform to the same regulations, and awards will be made on the basis of the cost of work done per ton mile. If these figures can be obtained with a tolerable degree of accuracy they will be not only interesting, but of wide industrial value, for one of the great difficulties to-day in determining the economical utility of the motor vehicle for business purposes is the lack of trustworthy statistics in determining what similar machines ought to do under practically similar conditions.

The plan as at present proposed is to require the competing cars to run over two routes. One will be the long route, extending from the clubhouse to Kingsbridge, at 230th Street, by way of Central Park West, Amsterdam Avenue, and Upper Broadway, returning by way of Sedgwick Avenue, Jerome Avenue, over Central Park Bridge, down Seventh Avenue to the Park, and then to Fifth Avenue, back to the clubhouse. This will be a twenty-mile route. The shorter route, of ten miles, will run south down Fifth Avenue and Broadway to the Battery, returning by way of West Street, thus taking the cars through the most congested traffic sections of the city.

## The Current Supplement.

The current SUPPLEMENT, No. 1607, opens with an article on the flamingo and its queer nest, in which article are described the researches of Frank M. Chapman in Bermuda. Striking illustrations accompany the article. Major Ormond M. Lissak describes methods of measuring the velocities of projectiles and pressures in cannon. Internal strains in iron and steel are discussed by Henry D. Hibbard. Those who are interested in the new alcohol law will, no doubt, welcome the publication of a digest of the regulations which have recently been issued by the Internal Revenue—regulations which will definitely settle in what manner alcohol may be made and denatured under governmental supervision. The work of the Reclamation Service is described and illustrated. Percy H. Thomas discusses some fundamental characteristics of mercury vapor apparatus. The Atkins dry process of generating acetylene gas is described by the English correspondent of the SCIENTIFIC AMERICAN with the help of diagrams and photographs. A 50-horse-power four-cylinder Crossley vertical oil engine with a new system of governing forms the subject of an interesting article. The usual trade notes and formulæ will be found in their accustomed places.

A parliamentary return has been obtained by Sir Charles Dilke giving the numbers of submarines built or in course of construction for the leading naval powers. France stands at the head of the list with 39 built and 50 in course of construction; Great Britain stands second with 25 built and 15 on the stocks; Russia's figures are 13 and 15; United States 8 and 4; Italy 2 and 4; Japan 5 and 2; and Germany has one submarine in course of construction.