

#### Source of the Sun's Heat.

The following is an abstract of Professor Thompson's (of England,) article—often referred to—in which he advocates the hypothesis, "that meteors falling into the sun give rise to the heat which he emits."

All the theories that have yet been proposed to account for the heat of the sun, he remarks, as well as every conceivable theory, must be one or other, or a combination, of the following three:—

1st. That the sun is a heating body, losing heat.

2d. That the heat emitted from the sun is due to chemical action among materials originally belonging to his mass, or that the sun is a great fire.

3d. That meteors falling into the sun give rise to the heat which he emits.

It is demonstrable that unless the sun be of matter inconceivably more conductive of heat, and less volatile, than any terrestrial meteoric matter we know, he would become dark in two or three minutes, or days, or years, at his present rate of emission, if he had no source of energy to draw from but primitive heat.

The object of the communication is to consider the relative capabilities of the second and third hypotheses to account for the phenomena.

In the first place, it is probable that there are always meteors falling to the sun, since the fact of meteors coming to the earth proves the existence of such bodies moving about in space. It is easy to prove that meteors falling to the sun must enter his atmosphere or strike his surface with immensely greater relative velocities than those with which meteors falling to the earth enter the earth's atmosphere, or strike the earth's surface. Now, Joule has shown that immense quantities of heat must be generated from this relative motion in case of meteors falling to the earth—and it is all but certain that, in a vast majority of cases, this generation of heat is so intense as to raise the body in temperature gradually up to an intense white heat, and cause it to burst ultimately into sparks in the air, and burn, if it be of metallic iron, before it reaches the surface. Such effects must be experienced to an enormously greater degree before reaching his surface, by meteors falling to the sun, if, as is highly probable, he has a dense atmosphere. Hence, it is certain that some light and heat radiating from the sun is due to meteors.

It is estimated that the quantity of matter that would be required to strike, is about a pound to the square foot for every five hours. At this rate, the surface would be covered to a depth of thirty feet in the year, if the density of the deposit is the same as that of water. We find the source of meteors principally within the earth's orbit; and we actually see them there as the "zodiacal light," according to Herschel, an illuminated shower, or rather tornado of stones. The inner parts of this tornado are always getting caught in the sun's atmosphere, and drawn to his mass by gravitation. The outer edge of the zodiacal light appears to reach nearly to the earth at present; and in past time it may be that the earth has been in a dense enough part of it to be kept hot, as the sun is now, by drawing in meteors to its surface. This calculation is according to Mr. Waterson's form of the theory, but, according to Prof. Thompson's, the fall of meteors must be twice that determined above. Then the whole surface would be covered annually to the depth of sixty feet, and the sun would grow in diameter a mile in eighty-eight years. Even at this rate, it would take 4,000 years to grow sufficiently to make the change apparent to the most refined observations.

A body of such dimensions as the sun might, by entering a cloud of meteors, become incandescent intensely in a few seconds, and on again getting to a position comparatively free from meteors, as suddenly become dark again.

A supposition that some of the fixed stars are suns irregularly supplied with meteors from a nebulous atmosphere, which revolves elliptically around, and occasionally envelopes them, may, on this hypothesis, be suggested

as a theory to account for the existence of periodically fixed stars.

If the sun is burning, and its conditions are similar to those of the earth, the fire would be choked, and by no conceivable adaptation of air and fuel, could keep a light for more than a few minutes. If it contains within itself all the elements of combustion, to give the amount of light and heat required would by demonstration cause it to burn away in 8,000 years. If the sun has been burning at that rate, it must have been of double diameter, quadruple heating power, and eight-fold mass, only 8,000 years ago.

#### The Steamship Great Britain.

This iron steamship, once astonishingly large, has, since her last visit to this country, been employed both in the Australian trade and Government transit service, making, under steam alone, a maximum speed of 8 1-2 knots, at an average consumption of from 33 to 38 tons of coal daily. She has now been again overhauled, and was to have left for Australia as both a full rigged clipper ship and a first class steamer, on the 15th of February.

The Liverpool Courier says that—"the mainmast weighs eighteen tons, and is forty-three inches in diameter. The size of her spars have also been increased, so that she will now have nearly one-fourth more sail than she formerly spread. Above the lower masts all the spars are brand new. The lower yard of the Great Britain, which, like all her other yards, is of pitch pine, is 105 feet long, and 25 inches in diameter. Her lower topsail yards are 90 feet long; her upper topsail yards 83 feet long; her top-gallant yards 60 feet long, and her royal yards 47 feet long."

#### Science and the Industrial Arts.

The Philadelphia Ledger, in remarking upon the above subject, expresses the opinion that in the use of improved machinery American flour mills are far in advance of those in Europe. At the commencement of the present century, the French, as well as ourselves, introduced the system of creepers and elevators, by which a considerable amount of labor was saved, and the operation of grinding rendered more complete; and from time immemorial it has been the custom to drive the millstones from a large spur wheel, round which they were placed, in the middle of the mill. This arrangement of the grinding process is still in use in many parts of France. The millstones are generally driven by straps or belts; in England, almost always by gearing.

A gigantic enterprise is contemplated in London, namely, the adoption of Mr. Stephenson's magnificent plan, to perfect a railway from London to Calcutta direct—the only interruption being at the Straits of Dover and the Bosphorus. By this route, the distance will be accomplished in less than a week. It will occupy ten years in constructing. A surveyor is now making flying levels.

#### Hail.

The New York Almanac remarks that hail is chiefly restricted to the temperate latitudes, and in these is most frequent during spring and summer. Within the tropics it seldom falls at a lower altitude than from 1,500 to 2,000 feet above the level of the sea. The explanation usually given of this fact is, that the temperature, which increases downward to the surface of the earth, is constantly so high in those regions that hail never descends to a lower altitude than that above-mentioned without being melted.

The squall of wind, or whirlwind, which accompanies and ushers in the hail storm, is no doubt produced by the depression of temperature which the hail communicates to the lower atmosphere in its descent to the ground.

Hail presents every appearance of having frozen during its fall, and not like snow of freezing in the form of clouds. It has much puzzled meteorologists to show why rain should ever get frozen in descending to a lower altitude, instead of melting and coming in the shape of rain. A cold current of air blowing suddenly in the direction of a rain cloud, is understood to be the immediate cause of most hail showers. The large size of hail stones is attributed to an accumulation during the progress of their descent. It is probable that the largest commences with a small nucleus, which receives continued accessions from

vapory particles in the neighborhood. Accordingly, hail-stones are found to be smaller on the tops of mountains than in the neighboring plains and valleys, because, not falling so far, they do not augment their size by the addition of successive layers of watery vapor.

#### Fountain of Blood in a Cavern.

E. G. Squiers' notes on Central America describe a wonderful effusion of a fluid resembling blood near the town of Vitud, in the State of Honduras. It appears that there is continually oozing and dropping from the roof of a cavern there a red liquid, which upon falling coagulates so as to precisely resemble blood. Like blood it corrupts, insects deposit their larvae in it, and dogs and buzzards resort to the cavern to eat it. Attempts have several times been made to obtain some of this liquid for the purpose of analysis, but in all cases without success, in consequence of its rapid decomposition, whereby the bottles containing it were broken. The small cavern or grotto during the day is visited by buzzards and hawks, and at night by a multitude of vampire bats for the purpose of feeding on the unnatural blood. It is situated on the border of a rivulet, which it keeps reddened with a small flow of the liquid, which has the color, taste and smell of blood. In approaching the grotto, a disagreeable odor is observed, and when it is reached there may be some pools of the apparent blood in a state of coagulation. Dogs eat it eagerly.

The peculiarities of the liquid are considered due to the rapid generation in this grotto of some very prolific species of infusoria. The California State Journal remarking on the above observes that the estero of the town of Monterey contains a species of blood red infusoria, (the larvae of water insects,) which at certain seasons of the year smells precisely like fresh fish, or on exposure in a vessel, like putrid fish. In some seasons it has been found dried in flakes, and of the intense color of vermilion.

#### Laying the Great Telegraph.

The Secretary of the Navy has ordered the U. S. steamers Niagara and Mississippi to proceed to England at the proper time this summer, to assist in laying down the submarine telegraph cable between Newfoundland and Ireland. The Niagara is the largest steam vessel of war in the world, and the Mississippi is the most powerful paddle-wheel steamer in our Navy. It is not yet known what two ships the English government will furnish to perform its part of the undertaking. The Niagara will receive on board at London or Liverpool one half of the cable, and the other half will be put on board the English naval propeller. A paddle-wheel steamer is to attend on the propeller for each nation, so that in case of accident the propellers may be taken in tow and proceed on the voyage—a part of the programme we omitted in our notice last week. As justly remarked by the daily papers in chronicling the fact, "It is a sign of advancing civilization when the ships of war of these two great nations thus meet in mid-ocean, not for a naval battle, but in a peaceful effort to join the two hemispheres."

#### Controlling the Sex of Bees.

It has long been believed that the sex of bees can be controlled by changing the position of the comb. Thus the usual position of the drone cells, and also of the worker cells is horizontal; but if, after the eggs for the workers—which are neutral in sex—have been deposited, the cells be artificially changed from the horizontal to a vertical position, females or queens will be produced. It is now claimed as a discovery made by Mr. Samuel Wagner, of York, Pa., that the sex of bees are also controlled by the size of the cells. According to a statement set forth by a recent writer, the manner in which the bees proceed to make a queen, when a queenless hive is supplied with common worker cells and eggs, is as follows:—They gnaw the partitions of three cells away, and remove two of the eggs; the remaining one, when hatched, is fed with a substance termed by apiarians "royal jelly," which, according to experiments recently perfected, is elaborated in the stomach of the working bees, and has the peculiar property of stimulating and hastening the development

of the insect which, when grown, proves to be a queen. Whereas, the remaining eggs, including those laid within the same minute as the one chosen for a larger development, are not hatched until five days after. If the egg which is chosen for elevation should prove, from want of others younger, to be more than four or five days old, the process will be a failure.

#### Ingenuity of the Germans.

The following are some of the inventions generally credited to natives of Germany, and also the times when they were made known:—

"Saw mills in 850; sun dials in 898; fulling mills in 996; windmills and oil paintings, in 1100; spectacles in 1270; paper of linen rags in 1300; organs in 1312; gunpowder and cannons in 1318; hats in 1330; wire making in 1350; pins in 1379; grist mills in 1389; wood engraving in 1436; printing in 1436; printing presses in 1439; copperplate engraving and printing ink in 1440; cast types in 1442; chiming of bells in 1487; watches, letter posts or mails, etching and bolting apparatus, in 1500; gun locks in 1527; spinning wheels in 1535; almanacs, sealing-wax and stoves in 1546; telescopes in 1590; wooden bellows in 1610; microscopes in 1620; thermometers in 1638; mezzotint engraving in 1643; air pumps in 1650; electric machines in 1651; pendulum clocks in 1665; clarionets in 1690; white china ware in 1706; Prussian blue in 1707; stereotypes in 1709; mercurial thermometers in 1715; pianofortes in 1717; solar microscopes in 1736; the gamut in 1753; lithography in 1783."

These statistics, which we find floating in our exchanges, are probably not very reliable in regard to dates, in fact we feel certain that saw mills cannot be traced back so far, but the fact of nearly or quite all these important inventions originating in that country, is, we think, correct. Door locks and latches, the modern screw auger and gimlet, the cradle for harvesting, &c., are also credited to the Germans. At first thought, on reading the above, this patient, persevering, deep-thinking nation would appear to have introduced almost all the progress the world has seen.

#### Another Man of Science Gone.

Jacob W. Bailey, Professor of Chemistry and Natural Sciences at the United States Military Academy at West Point, died of consumption last week. Among scientific men, none ranked higher than he, in departments of chemical and microscopical research. He had bestowed much care upon the examination of the Infusoria; and his discoveries in the minute botany of the coral formations added very greatly to his celebrity. Science has sustained heavy losses in the space of three or four months. In succession, its ranks have been thinned by the deaths of Hugh Miller, Andrew Ure, Wm. C. Redfield, E. K. Kane, and J. W. Bailey. Professor B. was president elect of the American Association for the Advancement of Science, which meets in Montreal in August next.

#### Post Office Orders.

It has been recently stated that the British system of sending money orders has carried the equivalent of \$50,000,000 from place to place by mail, without the loss of more than \$200, while our system of "registering" letters is so notoriously inefficient that all well informed persons now prefer not to register them, as the act does not make the department responsible, but only serves to point out the money letters to thieves. In England no sums greater than £10 can be sent by Post Office orders, but in Canada as large sums as £25 can be sent, and under both conditions the plan is believed to have proved itself perfectly successful. The charge for each order is threepence or sixpence, and if larger sums than the limit prescribed are to be sent, it is only necessary to purchase two or more orders. It should be introduced here.

#### The Great Eastern.

Preparations are pretty nearly completed at Portland to accommodate the mammoth steamship Great Eastern on her arrival. A new pier has been built, the depth of water at the end of which is 30 feet at low water. This is considerably more than the ship will probably require.