

### AGE OF THE SUN AND EARTH.

There has been a long dispute between physicists and mathematicians on the one hand and the geologists and biologists on the other, as to the age of the earth, or rather, since that is equally involved, the age of the sun. Dr. Croll, the distinguished Scotch geologist, has recently offered a theory which is not altogether new, but admits of some novel arguments, which may serve all parties to the dispute. Beginning with a review of the different theories as to the sun's heat, he rejects the combustion theory as totally inadequate, since if the sun were all a mass of burning coal, it would not last over 5,000 years; the chemical theory does not prolong the duration sufficiently; the meteoric theory will not serve; the only remaining explanation is the gravitation or condensation theory. This supposes that the materials of the solar system were originally a nebula, extending through a space many times greater than the orbit of Neptune. The falling together, the condensation of this amount of matter, it can be mathematically shown, would supply enough heat to keep the sun at its present temperature for 20,000,000 years. Unfortunately, that period is not sufficient for the geologist. He demands at least 100,000,000 years for the changes of the earth's surface, and would prefer twice that length of time. The arguments of the geologists are almost unanswerable; those of the biologist who believes in evolution tend to the same point so far as they go. Professor Croll says that there is a way out of this difficulty, by supposing that the nebula was not cold but hot. If you suppose it hot enough to start with, you will have heat enough to carry you through. Obviously it is just as easy to suppose a hot nebula as a cold one. But Professor Croll proposes to provide for this original heat. If the solar system had originally consisted of two masses, each of half the density of the whole, at some immeasurable distance apart, and they fell foul of each other owing to the mutual gravitation, they would strike with a speed of 274 miles per second. If their motion was stopped by the concussion, an amount of heat would be developed sufficient to convert the whole into a nebula that would take 50,000,000 years to cool. This is decidedly an improvement on the cold nebula. But this supposes that the component halves, before they started on their way to a collision, had no motion. Let us suppose they were moving beforehand at the rate of 202 miles per second, and that this speed was added to what they got by gravitating towards each other; then we get, when they struck, a nebula extending beyond Neptune, and with heat enough for a sun of 100,000,000 years' duration. If you insist upon 200,000,000, you must give the original masses a speed of 676 miles per second, beforehand. It will be objected that no such motion has been observed in space. Even the planets do not make such fast time; the earth, for instance, going only a thousand miles in a minute. The fixed stars whose motion has been ascertained travel very much slower. But Professor Croll says the fixed stars are those that have gone through the collision process, and have lost their motion. The new hypothesis goes behind the ordinary nebular theory in point of time, giving an explanation for the formation of the nebula. But it presupposes that there may be vast, cold, invisible masses of matter rushing through space with such velocity that their mere touch would convert our globe into red hot gases and distribute it through infinite space. The conception is not incompatible with the sudden flaming out of a new star and its conversion into a nebula, as seems to have been the case with the Schmidt star in Cygnus; but the facts in that remarkable case were probably not known to Prof. Croll at the time his essay was written.—*N. Y. Tribune*.

**THE PETROLEUM INDUSTRY IN RUSSIA.**—The Russian capitalists who are working the petroleum wells are now laying down iron pipes from the wells to the Black Sea coast, where ships may be loaded by pneumatic pumps. It was recently reported that an American company had petitioned the government for a concession to work all the petroleum wells in Asiatic Russia. It was pointed out to the authorities, however, that the Americans are aware that Russian petroleum will enter into serious competition with American, and that this was an effort to paralyze the trade.—*Am. Manufacturer*.

**PROFESSOR BARRÉ'S PROCESS FOR PREVENTING CORROSION OF IRON** is looked upon by the Warden of the Standards as likely to prevent the oxidation of standard weights made of iron. Prof. Barré has undertaken to submit some specimens of iron weights to this process, and it is intended to place these weights in the hands of some local inspector of weights and measures, so that it may be ascertained whether iron standard weights thus protected could safely be used in place of the expensive bronze or brass standard weights at present used.—*Engineer*, xlv, 261.

DECEIT and falsehood, whatever conveniences they may for a time promise or produce, are, in the sum of life, obstacles to happiness.

How to make a preparation to coat paper moulds so that a mixture of glue and molasses will not adhere to the paper.—Dip the moulds in melted paraffin, and when cold cover them uniformly with a thick oil.

**CEMENT UPON IRON OR STONE.**—A cement made of glycerine and litharge hardens rapidly, and makes a durable cement upon iron and stone. It is insoluble, and is not attacked by acids.—*American Builder*, xiii, 252.

**PUTTY USED BY CARRIAGE PAINTERS.**—Take dry white lead and mix with 1 part brown Japan and 1 part carriage rubbing varnish. A common wagon putty is made by using whitening in the place of dry white lead and adding a small quantity of white lead in oil, from the keg. This putty should be kept in water when not in use, to prevent drying.

**SAW-SET FOR RIBBON SAWS.**—The Chemnitz tool factory, Chemnitz, Saxony, makes a mechanical saw-setter which acts as follows: On turning a hand-wheel motion is given to two levers, standing opposite each other and perpendicular to the saw, the steel point of one lever taking a tooth on the right side of the saw and the point of the second lever a tooth immediately in advance of the other, to the left. These two levers being lifted off, a third, acting parallel to the length of the saw, takes it a couple of teeth further on. This action is repeated on each revolution of the wheel and results in a very uniform setting of the teeth of the saw.

**BELLS.**—The invention of bells is attributed to Polonius, Bishop of Nola, Campania, about the year 400. They were first introduced into churches as a defence against thunder and lightning; they were first put up in Croyland Abbey, Lincolnshire, in 945. In the eleventh century, and later, it was the custom to baptize them in the churches before they were used. The Curfew bell was established in 1078. It was rung at eight in the evening, when people were obliged to put out their fires and candles. The custom was abolished in 1100. Bellmen were appointed in London in 1556, to ring the bells at night, and cry out, "Take care of your fire and candle; be charitable to the poor, and pray for the dead."

**FISH AS BRAIN FOOD.**—The belief that fish is specially adapted to feed the brain, and that fish-eaters are therefore more intellectual than the average, does not find much favor with Dr. Beard. He says that this "delusion is so utterly opposed to chemistry, to physiology, to history, and to common observation, that it is very naturally almost universally accepted by the American people. It was started," he adds, "by the late Professor Agassiz, who impulsively, and without previous consideration, apparently, as was his wont at times, made a statement to that effect before a committee on fisheries of the Massachusetts Legislature. The statement was so novel, so one-sided, and so untrue, that it spread like the blue-glass delusion, and has become the accepted creed of the nation.—*Popular Science Monthly*, lxvii, 127.

**VARIOUS PRACTICAL USES OF ASBESTOS.**—The uses to which asbestos can be employed are multiplying steadily; it is not only in the United States that this movement is going on, but also in many foreign countries. At the head of all stands Italy, which country making is now giant strides in the road of progress, practically as well as purely scientifically. Its practical industrial progress was lately shown in an interesting exposition of asbestos, which was recently held in Rome, the material being exhibited under all forms, from the crude state as mined to its highest industrial preparations. There were samples of thread made from the mineral which were stronger than the best English cotton; cloth, from coarse bagging to a fabric as fine as linen; paper for writing, printing, and sheathing building, and pasteboard. The asbestos paper is made at Tivoli, and costs about 40 cents per pound. It is especially useful for important documents which it is desired to preserve from fire. To test the fire-proof qualities of the pasteboard, a case made therefrom was filled with ordinary paper, another case of pasteboard, not containing asbestos, but otherwise exactly similar, was likewise filled, and both were thrown into a fire. In the space of five minutes the unprepared pasteboard box and its contents were wholly consumed, while to that period the asbestos box remained uninjured. Much of the asbestos mined in Italy finds a market in the United States, where, thus far, only asbestos of short fiber, and unfit for spinning, has been found.