energy; but the former has to replace the wear and tear of the machine which consumes it, which the latter has not.

Energy can be changed from one form into another. The potential energy of the body may be converted into mechanical work by raising a weight, into kinetic energy, by setting a wheel in motion, heat by friction into electricity, heat, and light, by Wild's electrical machine.

A piece of zinc may be burned in a stream of oxygen. The potential energy becomes light and heat, but it might have been more slowly burned in a battery, it would thus develope electricity, which might be turned into kinetic energy by an electro-magnetic engine, or into light, sound, and heat, by a Ruhmkorff's coil.

Energy is indestructible. If it disappears in one form, it is only to reappear again. A hammer and nail on an anvil becomes hot, the energy which moves the hammer is transformed into heat in the nail, it is not lost. Friction appears to consume energy, but this is not so, for if proper appliances are used sufficient heat can be collected to boil ether or even water. Savart's apparatus is another instance, the kinetic energy of a rotating toothed wheel being by it transformed into sound.

Perpetual motion is impossible, because some energy is always uselessly expended in friction in every machine, and energy cannot be created. No water-wheel could pump up sufficient water to supply itself.

It has been (fallaciously) proposed to work a magneto-electric machine by a steam-engine; to decompose water with the electricity, and sustain the action of the steam-engine by the heat developed by burning the oxygen and hydrogen produced by the decomposition. It would be impossible for the steam-engine to decompose enough water for the purpose.

Since, therefore, energy cannot be destroyed, and cannot be created, the quantity of energy in the universe must remain constant. This is the principle of the conservation of energy.

All the different forms of energy in the earth, whether derived from food, fuel, wind, or water, can be traced to the heat radiated from the sun The heat is sustained in the sun by the transformation of potential energy into heat due to the sun's contraction. If the diameter of the sun diminished 1-10,000th part, heat sufficient to supply the present loss by radiation for 2000 years would be produced.

The heat of the stars represents a prodigious quantity of energy. The earth has a store of potential energy due to its distance from the sun; this energy is equivalent to as much heat as would be produced by the combustion of 6000 globes of coal, each as large as the earth. Beyond this, it has an amount of energy due to its velocity in its orbit, equal to that which would be produced by the combustion of 14 globes of coal of its own size. To this must be added a quantity of energy due to its rotation on its axis.

A period of rest, however, must at length come. The planets, since they are not rigid bodies, must ultimately fall into the sun. Heat diffuses itself, but heat cannot be turned into mechanical energy, except when transferred from a hot body to a cold body. When, therefore, by the diffusion of heat, the temperature is uniform throughout the universe, mechanical work must cease.—*Iron.*

Pre-historic Culture of Flax.—Dr. Oswald Heer, the eminent botanist, and one who has devoted so much attention to the structure and history of fossil plants, publishes an article upon flax and its culture among the ancients, especially the pre-historic races of Europe. His memoir may be summarised as follows: First, flax has been cultivated in Egypt for five thousand years, and that it was and is one of the most generally diffused plants of that country. It occupied a similar position in ancient Babylonia, in Palestine, and on the Black Sea. It occurred in Greece during the pre-historic period, and at an early date was carried into Italy, while its cultivation in Spain was probably originated by the Phœnicians and Carthaginians. Second, it is also met with in the oldest Swiss lacustrine villages, while, at the same time, no hemp nor fabrics manufactured from wool are there to be found. This is considered a remarkable fact, since the sheep was one of the oldest domestic animals, and was known during the stone period. The impossibility of shearing the fleece by means of stone or bone implements is supposed to have been the reason why woollen fabrics were not used. It is thought probable that the skin, with its attached wool, was probably made use of for articles of clothing. Third, the lake dwellers probably received flax from Southern Europe, from which section fresh seeds must have been derived from time to time. The variety cultivated was the small, native, narrow-leaved kind from the coast of the Mediterranean, and not at all that now raised in Europe. It must, therefore, have been cultivated also in Southern Europe, although Dr. Heer could not ascertain among what people and at what age this took place. If this could be ascertained it would be an important point in the determination of the antiquity of the lake dwellers. Fourth, at the time of the empire both summer flax and winter flax were cultivated in Italy, as now, but in what form it was grown in ancient Egypt is not determined. It is thought probable that the narrow-leaved variety was first introduced, and after that the Roman, and then the common varieties followed. The common plant has doubtless arisen from the cultivation of the narrow-leaved, while the Roman winter flax and the *Linum ambiguum* constitute the intermediate stages. The original home of the cultivated flax was therefore along the shores of the Mediterranean. The Egyptians had probably cultivated it, and from them its use was doubtless disseminated. It is possible that the wild variety and the winter flax were grown elsewhere at the same time, when the cultivated variety had long since driven them out of use in Egypt.—*Nature.*

Among the rarer and more interesting remains found in the mounds of the west of America, are plates of mica cut into different shapes, and evidently preserved as objects of great rarity and value; and, in the absence of this mineral in the Mississippi Valley, the question has frequently arisen whence the material could have been derived. A recent communication from Prof. W. C. Kerr, the State Geologist of North Carolina, tends to throw some light on this subject, and to open an interesting chapter in regard to the American prehistoric man. The work of collecting mica is at present carried on upon the largest scale in the high and rugged region between the Black Mountain, the Roanoke and the head waters of the Nolachucky, principally in Mitchel County, North Carolina. The region in question has long been known for the existence of numerous open works and tunnels, which at first sight, were supposed to have been made in the search for silver or some other valuable metal. Prof Kerr, in his capacity of State Geologist, was led to investigate this question, and very soon found, in every instance, that the excavations referred to were much older than the earliest discovery of the country by the Spaniards, and that in all cases they were found in ledges of coarse granite, which contained nothing but large patches of mica. Prof Kerr has been satisfied for some time that in these mines we have the work of contemporaries of the mould builders, and the localities whence they derived the mica. What use they made of it we cannot say; but it is suggested that it may have served the purpose of mirrors, or possibly have been used as windows, as well as for ornament. The number and size of these mines is remarkable, some of the open cuts being more than 100ft. in diameter, and 20ft. or 30ft in depth, even after the caving in and filling up of centuries of weathering. The tunnels often extend inwards several yards, but are said to be too small for a man of ordinary size to work in. These show distinct marks of the tool in the granite wall, as if made by a chisel-shaped instrument about an inch broad. Numerous plates of mica are found in these tunnels and excavations, some of them trimmed to particular shapes. *Nature* observes that these facts open up a new chapter in the history of the American aborigines, illustrating the character of the commerce carried on at a very remote period, and showing the magnitude of the operations, and the extended period of time over which they must have been prosecuted, to enable a people furnished with nothing better than wooden and stone tools to produce excavations of so great magnitude.

Alexandria, Egypt, May 20.—The present party of the Oriental Topographical Corps from New York, for the exploration of the Bible Lands, have gone from Egypt to Syria and Asia Minor. A scale photograph of the Nile, devised by one of the corps, has been taken, which it is claimed will definitely settle the vexed cubit question. A plan of rapidly taking altitudes of ruins, pyramids, &c., invented by one of the party, is said to work admirably.