very slight, less indeed than that caused by the Sun's comparatively minute tidal wave. The Moon now bulges towards the Earth as a result of the tidal-strain upon its once viscous mass. And still both Moon and Earth are mutually trying to make the other rotate synchronously with the period of revolution of the pair. The Earth has already succeeded and the Moon will doubtless ultimately succeed in regard to the Earth too. But the brake the Moon can now exert upon the Earth's rotation is now very small, being indeed unappreciable within historic times. For the last 46 million years the lengthening of the day has only attained 8 and 1½ hours, from 15½ to 24 hours period. When the Moon was just flung off from the Earth, about 60 millions of years ago, her distance was but 1½ radius, and the Earth was but very slightly larger than it is now. The table of dates and measurements is given by Professor Darwin as follows:—57 millions of years ago, the sidereal day in M. S. hours was 5·60, the Moon's sidereal period was 0·23 days, number of days in month was one, Moon's distance from Earth was 1·5 Earth's mean radii. 56·81 million years ago, the day was 6·75 hours, the month was 1·58 days, the number of days in month was 5·62, and the Moon's distance was 9 radii. 46·30 million of years ago, the day was 15·50 hours, the month was 18·17 M. S. days, the number of days in the month was 29·77, the Moon's distance was 47 radii. At present the day is 23·93 hours, the month is 27·32 M. S. days, the number of days in the month is 27·4, and the Moon's distance is 60·27 Earth's radii.

A Mathematical Calculation showing that the Duration of the Sun's Radiating Energy is sufficient to meet the demands of Geology

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If the gaseous mass of the Sun is in isothermal equilibrium, and subject to the law of behaviour of perfect gases, then the accumulated energy in the Sun is equal to

$$\frac{M^2}{R}$$

Where M is the Sun's Mars and R its radius, and since the annual loss of the Sun's energy by radiation into space is known from experiment to be equal to

$$\frac{M^2}{R\ 32\times 10^6}$$

the duration of the Sun's radiating energy will be 32 million years. But if we admit a more rapid concentration towards the Sun's interior, this duration may be calculated to be as much as 50 million years.

In a gaseous sphere the ratio

$$\frac{\rho}{\zeta} = \frac{M}{2R} = KT$$

Hence the temperature T varies inversely as the radius. And if we assume that the diameter of the photosphere varies proportionally to a certain power N of the time and let T be the whole time that has elapsed since the origin.

Then the quantity of energy dQ lost by radiation during the time dt at the epoch t, can be represented by the formula

$$dQ = K\left(\frac{t}{T}\right)^{2n} dt$$

K being the constant of radiation in unit time. Hence we have, for the total quantity of energy, dissipated by radiation.

$$Q = \frac{K}{T^{2n}}\int_{=0}^{=T} t^{2n}\,dt = \frac{KT}{2n+1}$$

The duration θ of radiation for a photosphere of the actual present dimensions of the Sun's photosphere will be

$$Q = K\theta,\ \text{Whence } T = (2n+1)\ \theta$$

If the radius of the photosphere varies as the time $(n=1)$, then $T=3\,\theta=150$ millions of years.

But if (as is not improbable) the radius of the photosphere varies as the square of the time, then T will be as much as $=250$ millions of years.

Hence we have shown that the duration of the Sun's radiating energy is very probably much greater than is generally supposed, and is indeed sufficient to meet the utmost demands of the Geologists.