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## Effect of a Shorter Day upon Biotic Diversity

Counts of growth lines on fossil organisms indicate that the number of days per year has decreased through geologic time (Wells, 1963; Runcorn, 1964; Mazzullo, 1971). This result is a consequence of the slowing axial rotation rate of the Earth due to tidal interaction in the Earth-moon system (Munk and MacDonald, 1960, p. 87; Stacey, 1969, p. 34). The decrease in rotation rate for the Earth at present is  $4.85 \times 10^{-22}$  radians  $\text{sec}^{-2}$ . For the Silurian period, this implies a day of 21.8 hrs if the rate of change is assumed constant through geologic time. A tidal interaction occurs also between the Earth and the sun. However, the relative change in the length of the year is small and for most purposes can be considered constant. Using Mazzullo's estimate of 421 days per year for the Silurian period, the length of the day must have been then approximately 21 hrs.

A principal effect of a shorter day on the environment would be to increase temperature equability because of less temperature differences between the days and nights. Of the many theories that have been advanced to account for species diversity, those involving environmental stability (including temperature) seem to be the most popular. We propose that the thermal stability resulting from the shorter day could be one of the contributing factors in the regulation of biotic diversity and we would like to propose the addition of this effect to other mechanisms purported to have influenced faunal diversity in the past.

This effect would obviously be more im-

portant to the terrestrial than to marine biota because of the ameliorating effect of the water medium. Also it should be noted that this refers to intra-habitat diversity. Total diversity (for example, within a whole continent) could be affected by other factors such as equator to pole temperature gradient.

At present, there is no known way of determining how important this factor could have been relative to other effects that have controlled faunal diversity. However, we suggest that diversity would have been lower throughout geologic time if the length of the day were the same as it is at present, but that because of the thermal stability resulting from the shorter day, species diversity has been enhanced.

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