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Question Box

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itself "is somehow being replenished there too from the only form of energy that we know to be all the time leaking out from the stars to interstellar space, namely, radiant energy."

In this view the material of the sun and stars is being continuously converted into radiant energy, which is lavishly dispersed to space, where, under very different conditions, it is being reconverted into hydrogen and the heavier elements, perhaps to be gathered at some future time, millions and billions of ages hence, into new worlds and systems. Thus the universe may be continuously rejuvenated.

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QUESTION BOX

Question:

Wood is opaque to light but is easily penetrated by X rays. The latter, however, are stopped by some kinds of clear glass. Does this not show that light and X rays are of different nature?

Answer:

No, this is not an indication of difference in nature. Ruby glass freely transmits red light, but is opaque to blue. Blue glass, on the other hand, is transparent to blue light but opaque to red. These two colors differ not in nature but only in wave length, the blue wave being approximately half as long as the red. So also X rays and light are alike in nature. Both are electromagnetic waves and travel through space with exactly the same speed. They also differ only in wave length, the wave of light being one thousand to ten thousand times as long as that of the X ray. W. H. Kadesch.

Question:

Is it desirable to study the theory of evolution in connection with a high school course in Botany? If so, to what extent?

Answer:

It is desirable to study this theory but the extent to which it can be discussed depends upon the amount of time available. The general idea of progressive change from simple to more complex forms should be presented with as much illustrative material as it is possible to secure. Certainly the students should not fail to get the idea that the plants of the present are the modified descendants of ancestral types which are now, for the most part, extinct. If time permits, a brief discussion of some of the evidences of evolution would be worth while. Also, a simple presentation of the theory of natural selection of mutations would be profitable. The study of evolution should, in the opinion of the writer, come after the students have a pretty accurate knowledge of the fundamental principles involved in the growth and development of plants. O. R. Clark.

Question:

What is the purpose of crop rotation?

Answer:

To those who desire a full consideration of the function of a crop rotation, I suggest Illinois Bulletin 300. This bulletin cites data from the oldest experimental field in the world on this subject.

In answer to the question "What is the purpose of a crop rotation?", I will say that there are several purposes.

1. A crop rotation keeps the productive power of the soil (its fertility) at a higher level than does a continuous cropping system.

Over a period of 55 years at the Illinois Station continuous corn has decreased in yield from about 75 to 20 bushels per acre. In a rotation of corn and oats the yield has fallen to about 35 bushels of corn. In a rotation of corn, oats, and clover the yield has fallen to about 56 bushels of corn per acre. It is apparent, therefore, that a crop rotation will **not** maintain the fertility of the soil. Under any cropping system, unless fertilizers are applied, the yield must decrease.

If a poor soil were taken up and a crop rotation established, the yield would likely increase over that of continuous cropping. However, in no way could the yield be carried to a high level since a crop rotation does **not** add fertility to the soil.

If a legume is included in the rotation and if the nitrogen fixing bacteria (Rhizobium Leguminosarum) are present, and if the legume crop is returned to the field which grew it, as a green manure or as barn manure, then the nitrogen content of the soil may be increased. But in no case can any other element of fertility be added to the soil by a crop rotation. Consequently a rotation, even where a legume is included, cannot maintain, much less increase, the fertility of the soil in its most common deficient element, namely phosphorus. This must be purchased.

2. A crop rotation utilizes labor of men, horses, and machinery to better advantage than continuous cropping.

3. A crop rotation holds in check certain injurious insects and diseases.

4. A crop rotation insures some income each year.

5. A crop rotation enables the farmer to establish and maintain a system of livestock farming. Winfield Scott.

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THE PLANETESIMAL HYPOTHESIS

(Continued from page 3.)

tative control balances its explosive force. If the sun ever lost matter in the past, some additional force must have operated in conjunction with eruptive action to prevent the erupted matter from returning to the sun and to cause it to move in orbits around the sun. To account for this disrupting force, it was assumed that a star from space came within the field of the sun. The distance was not postulated except to say that it did not come within the Roche limit which is 2.44 times the radius of the larger body. Had the visiting star come within this limit, our ancestral sun would have been totally disrupted and a solar system would probably not have formed.

To understand the effect of a close approach of a star to our sun, let us look at the effect of the moon on the earth. Tides are caused by the gravitative pull which varies inversely as the square of the distance between the two attracting bodies. When the moon is at position 1 (figure 1), high tides occur directly under the moon at 2, and on the opposite side from the moon, at 3. The portion of the earth nearest the moon is most strongly pulled, and the mobile water rises in the form of a tide. The center of the earth is likewise pulled away from the farther side, causing a similar rise there. Centrifugal force also aids in banking up the water in the form of a high tide at 3.

A star passing near our sun would, in like manner, cause solar tides. If the passing star were at a great distance from the ancestral sun, only moderate solar tides would result. If, on the other hand, the approach were sufficiently close, the strong differential attraction would cause disruption of our sun. There are many possibilities involved in the case. The star may have been large but removed at a great distance, or small and close to the sun. The final effect on the ancestral sun would depend upon the size, nearness of approach, and rate of movement of the passing star and upon the internal state of the sun at the time.

The passing star when it reached position S', of figure 2, with our sun at S, produced tidal strains, one on each side of the solar equator similar to the tides on the earth. It is known that there are now very turbulent belts on both sides of the sun's equator in latitude 5°-30°. The passing star was thus able to reduce the effect of the sun's gravitative force in this vicinity so that gaseous bolts were shot away from the sun's surface. The first one on the near side was the Mars bolt while