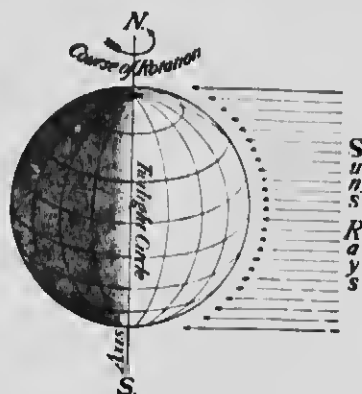


of illustrating the way the earth is lighted by the sun, is by means of a globe and a light in a darkened room. In whatever position the globe is held, it will always be half in the light and half in the dark. The boundary between the dark and the light side will



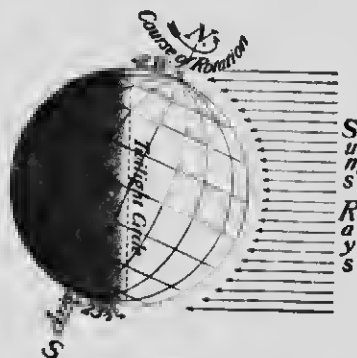
The sun's rays reaching both poles at the equinoxes.

be a circle dividing the globe into halves. This circle of the earth is called the *twilight circle*, because it marks the boundary between day and night. The twilight circle always cuts the equator in halves; hence, day and night at the equator are always equal, each twelve hours in length.

**The Equinoxes.** When the sun is directly overhead, or in the *zenith*, at the equator, the twilight circle passes through the poles; the days and nights are equal in length throughout the world; and all the earth is lighted in each twenty-four hours. This occurs on the twenty-first of March and the twenty-second of September; and, hence, these two dates are known as the *equinoxes*, or the times of equal days and nights.

### Summer and Winter.

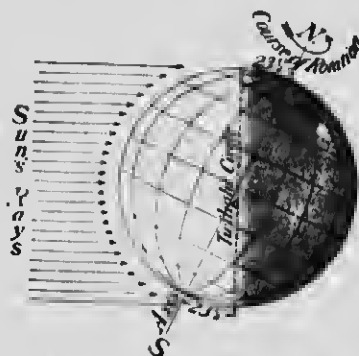
As the earth moves along in its course from the twenty-first of March, the north pole leans more and more toward the sun, until it



The sun's rays reaching  $23\frac{1}{2}$  degrees beyond the north pole at the summer solstice.

reaches its extreme position on the twenty-second of June. Then the sun shines  $23\frac{1}{2}$  degrees beyond the north pole. At this time its rays fail to reach the south pole by  $23\frac{1}{2}$  degrees. Thus, there is at this season a circular area about the north pole which is continually in sunlight, and one about the south pole which is continually in darkness. Six months later, that is, on the twenty-second of December, the conditions are reversed; the south pole leans toward the sun and the north pole away from it.

Between the twenty-first of March and the twenty-second of September the larger part of the lighted half of the earth is in the Northern Hemisphere, and the days in that hemisphere are everywhere longer than the nights. In the six months from the twenty-second of September to the twenty-first of March, the days in the Southern Hemisphere are similarly longer than the nights. Thus, the Northern Hemisphere has summer while the Southern Hemisphere has winter, and winter while the Southern Hemisphere has summer.



The sun's rays reaching  $23\frac{1}{2}$  degrees beyond the south pole at the winter solstice.

**Circles and Tropics.** The boundary lines of the polar areas are, therefore, circles  $23\frac{1}{2}$  degrees from either pole and marking the extreme limit of the sun's rays on the twenty-second of December in the Northern Hemisphere, and on the twenty-second of June in the Southern Hemisphere. These two circles are important lines and are known as the *Arctic* and *Antarctic Circles*. The northern and southern limits of the vertical sun are known as the *Tropics*, from a word meaning "to turn," because the vertical rays first