



High in the eastern sky shines Vega, brightest star to be seen in this month of honey-moons.

year. Before the days of Copernicus it was noticed, and an elaborate mechanism had to be invented to explain it. The astronomers of those early days had noticed that all the planets seem to have a general progression eastwards among the stars, along with the sun, and they explained this by saying that each planet, as well as the sun and the moon, was attached to a vast crystal sphere, which revolved around the earth in its proper period. Each was supposed to give out a musical note as it revolved, and this caused the "music of the spheres."

Then, when the alternate backward motion of Jupiter, as well as of other planets, was noticed, they decided that the planet was not attached directly to the large crystal sphere, but to a smaller one, which, in turn, was fastened to the great one. The smaller sphere was called an epicycle. Thus the planet would be carried generally in one direction, but sometimes its motion in the epicycle would be added to that of the great sphere and it would seem to be going unusually rapidly. Again, the former motion would be in the opposite direction and the planet would move backwards. As more refined measures of the planets were made, still other irregularities were discovered and more epicycles were added, one on top of the other. Finally, as Sir Arthur Eddington once expressed it, "the music of the spheres became lost in the whirl of machinery."

Such a theory seems ridiculous to us now, but it held for centuries. Even after Copernicus suggested a much simpler explanation, additional centuries were required to secure the adoption of his idea, and men were even imprisoned for believing that the earth moved.

According to our modern ideas, then, the motion of Jupiter is explained in this way. The earth is travelling eastward in its orbit around the sun, at a speed of about eighteen miles a second. Jupiter is also going eastward in its orbit, but at a speed of only about eight miles a second. When the earth and Jupiter are on the same side of the sun we go by the more slowly moving body, and it, in effect, is going backward relative to us at a speed of some ten miles a second. And a little later when we are on the opposite side of the sun, the two motions are added. As the earth begins to turn around to the opposite side of the sun, there is a brief period when the two motions just balance, and this is what happens on June 11. A very similar effect can be observed from a rapidly moving express train when it passes slower freight on the next track. Even though both are moving in the same direction, the freight train, to people on the express, seems to be going backwards.

It is also on account of the motions of the planets around the sun that Mercury, the smallest and innermost of the planets, can be so seldom seen. During June there will be the best opportunity afforded by 1934 to see this elusive little object, which Copernicus himself is said never to have viewed. Its average distance from the sun is only 35,950,000 miles, compared with 92,900,000 for the earth. It revolves around the sun at such a speed that it comes around between the sun and the earth every 116 days.

The result of this is that it swings back and forth like a pendulum, first on one side of the sun, then the other. When to the west of the sun, it comes up just before sunrise, and is a morn-

ing star; when to the east, as it is on June 14 in the early morning hours, it is visible in the west after the sun has set. The ancients noticed this but for a long time they did not realize that the planet they saw in the morning was the same as the one they saw in the evening, so they gave it two names—Mercury as an evening star and Apollo when it was seen in the morning twilight.

During June the moon is at last quarter on the 4th, new on the 11th, at first quarter on the 20th and full on the 27th. Thus moonlit evenings are on the schedule from about the 18th to the end of the month. On June 21 the moon passes Jupiter, and on that evening, as well as the evening before, the brilliant planet and the moon will be a conspicuous pair in the southern sky.

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SEISMOLOGY—BOTANY

## Plant Life Not Harmed By California Earthquake

**A**LTHOUGH it left a wake of death and ruin among the works of man, the Long Beach earthquake of a year ago seemed to exempt vegetation from its ravages, Dr. H. G. MacMillan, plant pathologist of the U. S. Department of Agriculture, states as the result of a careful survey of the shaken area.

In the past, Dr. MacMillan says, similar tremors have been the cause of fertile areas being transformed into deserts, but in the present example intermittent observations during the past year have revealed no injury to plants primarily due to the earthquake.

There are a few trees, Dr. MacMillan continues, which appear to be dying from gas injury such as would be caused by gas escaping from a broken or cracked main. Trees also standing on a local fault were injured, but on growing crops there was no visible effect, either at the time of the quake or later.

Dr. MacMillan points out that earthquake damage to plants may be caused by changes in the water level, a rise in the temperature of the soil water, or by mechanical injury to the smaller roots and rootlets of plants in the shaken area.

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Scientists have proved that certain hairy-coated soy bean varieties escape being eaten by leafhoppers merely because the hoppers object to the rough coat.