drawings of it at a three-inch refractor. With a two-inch objective, Grover not only saw the crape-ring, but Saturn's belts, as well, and the shadow cast by the ball of the planet upon its system of rings. In a telescope, Titan, Saturn's largest moon, is merely a point of light, as compared with the planet, yet it has been seen, so it is said, with a one-inch glass. The shadow of this satellite, while crossing the face of Saturn, has been observed by Banks with a two and seven-eighths objective. By hiding the glare of the planet behind an occulting-bar, some of Saturn's smallest moons were seen by Kitchener with a two and seven-tenths aperture, and by Capron with a two and three-fourths one. Banks saw four of them with a three and seven-eighths telescope, Grover two of them with a three and three-quarter inch, and four inches of aperture will show five of them—so Webb says. Rhea, Dione and Tethys are more minute than Japetus, yet Cassini, with his inferior means, discerned them and calculated their periods. Take the instance of Mars next. It was long believed that Mars had no satellites. But, in 1877, during one of the highly-favorable oppositions of that planet which occur once in about sixteen years, Hall, using the great 26-inch refractor at Washington, discovered two tiny moons which had never before been seen by man. One of these, called Deimos, is about twenty miles in diameter, the other, named Phobos, is only about twenty-two, and both are exceedingly close to the primary, and in rapid revolution. No wonder these minute objects—seldom, if ever, nearer to us than about thirty millions of miles—are difficult to see at all. Newcomb and Holden tell us that they are invisible save at the sixteen-year periods referred to, when it happens that the earth and Mars, in their respective orbits, approach each other more nearly than at any other time. But once discovered, the rule held good even in the case of the satellites of Mars. Pratt has seen Deimos, the outermost moon, with an eight and one-seventh inch telescope; Erck has seen it with a seven and one-third inch achromatic; Trouvellot, the innermost one, with a six and three-tenths glass, while Common believes that anyone who can make out Enceladus, one of Saturn's smallest moons, can see those of Mars by hiding the planet behind an occulting bar at or near the elongations, and that even our own moonlight does not prevent these lunar observations being made.

Webb says that "common telescopes," with somewhat high powers, will reveal stars down to the eleventh magnitude. The interesting celestial objects more conspicuous than stars of that magnitude are sufficiently numerous to exhaust much more time than any amateur can give to observing. Indeed, the lot of the amateur astronomer is a happy one. With a good, though small, telescope, he may have as subjects for investigation, the sun with his spots, his faculæ, his prominences and spectra; the moon, a superb object in nearly every optical instrument, with her mountains, valleys, seas, craters, cones, and ever-changing aspects renewed every month, her occultations of stars, and eclipses of the sun; the planets, some with phases, and others with markings, belts, rings and moons, with scores of occultations, eclipses and transits due to their easily observed rotation around their primaries; the nebulæ; the double, triple and multiple stars with sometimes beautifully contrasted colors. Nature has opened in the heavens as interesting a volume as she has opened on the earth, and with but little trouble any one may learn to read in it.

These are the palmiest days in the eventful history of physical and observational astronomy. Along the whole line of professional and amateur observation, substantial progress is being made; but in certain new directions, and in some old ones, too, the advance is very rapid. As never before, public interest is alive to the at-