generate core. This result is independent of the mass. When nuclear reaction (such as $^{16}\text{O} + ^{16}\text{O} \rightarrow ^{32}\text{S}$) are taken into account we have found that a further increase in temperature will take place during the nuclear burning phase. A "helium flash"-like instability may also develop. We thus conclude that a dense core will develop in a presupernova star independent of its mass. It does not seem likely that a star will reach the iron-helium phase change stage, which was suggested by Burbidge *et al.* (E. M. Burbidge, G. R. Burbidge, W. A. Fowler, and F. Hoyle, *Rev. Mod. Phys.* 29, 547, 1957), as a cause for supernova collapse.

Existence of Periodic Orbits of the Third Kind in the Elliptic Restricted Problem of Three Bodies and the Stability of the Generating Solution. RAM KISHORE CHOUDHRY, *L. S. College, Muzaffarpur, Bihar, India*.—Under the usual notations (Duboshin, *Anal. Kachestben. Nebes. Mexan.* 1964) which reduce to those introduced by Szebehely and Giacaglia for plane motion (*Astron. J.* 69, 230, 1964), having chosen the orbit of the negligible mass in the problem of two bodies in uniformly rotating axes for the intermediate orbit, the existence of the periodic orbits of the third kind of Poincaré's type (*Nouvelles Methodes*, Vol. 1) has been proved for the values m' of one of the primaries such that m'^2 and higher powers may be neglected. Lastly, following the method of the determination of characteristic exponents (Minorski, *Nonlinear Oscillations*, pp. 308–327), it is seen that the complete determination of the stability of the generating solution of the periodic orbits is not possible. By the word stability, the orbital stability has been meant.

Lunar Landscape Luminescence. ALVIN J. COHEN, *University of Pittsburgh*.—Let us consider the possibility that the moon has never been differentiated. With this premise, it is likely that the lunar surface was originally composed largely of magnesium silicates.

Magnesium silicate meteorites namely, the enstatite achondrites may well approximate the lunar surface and, in fact, may be of lunar origin. Many of these achondrites have undergone shock-brecciation similar to rocks in such craters in Quebec as Lac Couture, Clearwater Lakes, Manicouagan and New Quebec, and could well have been thrown off the moon during production of similar craters.

The enstatite achondrites exhibit both red and blue luminescence (Derham, Geake, and Walker, *Nature* 203, 134, 1964). The red luminescence is similar to that observed near Kepler after a solar flare (Kopal and Rackham, *Nature* 201, 239, 1964) and could be

due to excitation of either lunar matter or stony meteoritic debris from an asteroid or nucleus of a comet. The red luminescence is probably due to the substitution of Mn II for Mg II in the symmetrical Mg octahedral site in the orthoenstatite structure. It is not improbable that the blue luminescence is related to the substitution of Mn II for Mg II in the distorted Mg octahedral position in the orthoenstatite structure. It has recently been observed that the ratio of blue/red luminescence increases in disordered enstatite achondrites compared to enstatite achondrites that have not become disordered (Reid, Bunch, Cohen, and Pollack, *Nature* 204, 1292, 1964). Disorder is interpreted here as resulting from a hypervelocity shock wave produced by impact collision which distorts in some way the environment of the symmetrical Mn II so that the red luminescing environment is either destroyed or converted to a blue type.

It is suggested that magnesium silicates on the moon may exhibit both red and blue luminescence as do enstatite achondrites and that the ratio of blue to red luminescence as detected from probes may possibly be used as a guide for mapping the amount of shocked matter around lunar impact craters. The amounts of Fe II probably present in darker lunar areas would prevent the luminescence in these regions.

Detection of large areas of luminescence of the types described in the lighter regions would preclude a granite moon, but not lay to final rest the old hypothesis of the separation of the moon from the earth by tidal attraction. A nongranite moon would make the earth the only possible source of tektite parent material.

On the Structure of Saturn's Rings. A. F. COOK AND F. A. FRANKLIN, *Smithsonian Astrophysical Observatory and Harvard College Observatory*.—This paper shows first that Saturn's rings will collapse to a layer one particle thick if only gravitational forces are acting. In order to produce a ring of finite thickness, we postulate the accumulation of an electrostatic charge on ring particles, probably due to collisions with electrons. An analysis of the case of complete charge separation, i.e., the case in which the ion cloud is of much greater vertical extent than the region of the ring particles, demands that the average size of the ring particles be so small that this model can be eliminated on observational grounds. However, an examination of the case of small separation of charge reveals that if the particles have radii less than or equal to 0.1 cm, a ring of finite thickness can be maintained. Since the presence of electrostatic forces seems the most likely means whereby the rings may be kept at a finite thickness, we suggest that