of the Wolf-Rayet star where tides should be unimportant.

4. Since, by hypothesis, at mid-primary minimum even the uneclipsed portion of the O component shines through the whole extent of the Wolf-Rayet envelope which may seriously reduce its light, the observed depth of the primary minimum, combined with that of the secondary, can yield only a lower limit to the surface brightness of the Wolf-Rayet core. On the basis of preliminary computations it appears certain that the true surface brightness, and consequently the effective temperature, of the Wolf-Rayet core is at least as high as that of the O component, and quite possibly higher. Our hypothesis removes therefore any conspicuous discrepancy between the effective and ionization temperatures of the Wolf-Rayet star, which was previously emphasized by Gaposchkin and Wilson.

1. *Aph. J.* **97**, 311, 1943.
2. *Aph. J.* **93**, 402, 1942.

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McLaughlin, Dean B. The effects of a nova upon a nearby planet.

The loose statement that a solar nova outburst would completely vaporize the earth is tested quantitatively. A planet of the same mass, size, and composition as the earth is assumed at a distance of one astronomical unit from a typical nova of absolute magnitude -7 , luminosity $5 \times 10^4 \odot$. This maximum is of brief duration, and an assumed exposure of the planet to the radiation of a star of luminosity $10^5 \odot$ for ten days is considered a fair test. The nova is given further benefit of doubt by neglecting reflection and radiation from the planet.

The incident radiation would be 2×10^5 cal/cm² min, or about 3×10^9 cal/cm² total in ten days. The cross-section of the planet is 1.27×10^{18} cm², so that the total energy received would be 3.8×10^{27} calories. The mass of the earth is 6×10^{27} grams. Thus the received energy is only 0.6 calories per gram, or enough to heat the entire crust (specific heat 0.2, mass 0.01 of the planet's mass) through only 300°C. Owing to the low heat conductivity of rock, the effect would probably be melting and vaporization of a much thinner layer. Thus, the total energy, 3.8×10^{27} calories, could raise 1.3×10^{25} grams of silica to the melting point, 1470°C. This corresponds to a layer about 12 kilometers deep.

We next assume the planet to be a "black

sphere" and solve for the luminosity of a star which, at one astronomical unit, would maintain the planet at the boiling point of silica, 2500°K. The total energy received by the planet in unit time is $\pi r^2 E$, and that radiated is $4\pi r^2 \sigma T^4$, where $\sigma = 5.72 \times 10^{-5}$. Equating energy received to energy radiated, and putting $T = 2500^\circ$, we find

$$E = 8.9 \times 10^9 \text{ ergs/cm}^2\text{sec.}$$

Since the solar constant is 1.35×10^6 ergs/cm²sec, the required luminosity is $6.5 \times 10^3 \odot$, absolute bolometric magnitude -4.7 . This bolometric luminosity is reached by the nova within a month or so after maximum. After that date no further extensive vaporization of terrestrial rock could occur.

Evidently the planet would come through the outburst very drastically altered superficially, but essentially intact as regards its total mass. It appears even probable that the continents and ocean basins would not suffer extensive changes of height and depth respectively.

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Petrie, R. M. Absorption line intensities and spectral types for the O stars.

Total absorptions of eleven lines of hydrogen, neutral and ionized helium, ionized magnesium and triply-ionized silicon were measured for nineteen O-type stars. The majority of the stars are of early O-type, thus extending the work of Williams and Rudnick. Measured line intensities for twenty-eight O5-B1 stars are now available for studies of classification and absolute magnitude.

The three classification ratios *HeI/HeII*, *HeII/H* and *SiIV/HeII* arranged the stars unambiguously in the O5-Bo sequence. It was found that the singlet-triplet ratio of the diffuse series of helium exhibited no variation throughout Class O, so that this ratio cannot be used for the classification of the O stars.

The absolute magnitudes of twenty stars were calculated from the measured intensities of the K-line of interstellar calcium. The mean absolute magnitudes are as follows: O5, -5.0 (3); O6, -5.0 (3); O7, -4.8 (7); O8-O9, -5.1 (7). Correlation diagrams between line intensity and absolute magnitude failed to indicate a spectroscopic criterion of absolute magnitude for these high temperature stars.

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