- wards the east, 42 ± 22 mm (m.e.) south of the plate center, from Olson's method, about 25 mm east and about 40 mm south.
- e) Optical distortion. This is $+0''.51 \pm 0''.05$ (m.e.) $r^3/(100)^3$, r being the distance from the center of the plate in mm; pin-cushion type, determined from comparison with reference stars.

After the application of these corrections the mean error of one coordinate is approximately $0''.06$ in either coordinate per exposure.

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Fleischer, Robert and Conti, Peter S. A search for globules in the Palomar Sky Atlas.

A search has been made on prints of the Palomar Sky Atlas for globules, or small roundish dark nebulae. On the blue exposures O-175 with galactic longitude 333° , latitude -1° , and O-159 with longitude 337° , latitude $+5^\circ$, a first survey has resulted in not less than 10,000 and 7000 globules, respectively. The diameter of a typical object is 1 millimeter on the prints, or about 1 minute of arc.

The reality of these suspected globules is plausible in view of the *a priori* probability of 1 in 4000 of finding a one-millimeter circle with zero stars on a similar plate of randomly distributed stars, and also in view of the improbability of the star formations, rings, loops, and concave wedges, which mark their boundaries. Attempts to show that random distributions of dots would show "globules" failed due to the difficulty of producing true random distributions.

A count of stars in 340 one-millimeter squares in a typical region of print O-175 showed that the stars were not distributed at random in the squares. The assumption of a random distribution of stars overlain with the 21 globules marked in this region led to a predicted distribution of star numbers with a χ^2 probability of 5 per cent that it represents the observed star numbers. This is considered satisfactory evidence that the large number of globules is probably real.

Our typical globules are about 3 times the diameter of those marked by Bok and Reilly (1947). They supposed their globules to be at an average maximum distance of 1260 parsecs. If we assume ours to be closer in proportion to the apparent diameters, or at 420 parsecs, we find a space density of not less than 0.03 globules per

cubic parsec, which may be compared with an average space density in the vicinity of the sun of 0.1 stars per cubic parsec.

As this is a preliminary progress report, no more extensive publication is intended in the immediate future. A mimeographed report is available giving more details on the above points and some other provisional results of the search.

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Bok, B. J. and Reilly, E. F. 1947, *Ap. J.* **105**, 255.

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Greenberg, J. Mayo, Fleischer, Robert and Whitmer, Robert M. The problem of scattering by small particles.

Tremendous demands are being made by almost all the physical sciences on the theory of scattering of waves and particles by various obstacles. The astronomical problem of explaining the absorption and polarization of radiation which passes through interstellar clouds of matter appears to involve the calculation of scattering by assorted particles whose size is of the order of the wave length of visible light. It is just in this region that, barring recourse to tedious exact calculations, there do not exist many simple and reliably accurate approximations which in the final analysis are readily adaptable to rapid numerical computation.

One approach to this problem on which we have been working is the experimental determination of scattering of 3 cm microwaves by suitably scaled models of possible interstellar grains. The principal difficulty in this method is the separation of the scattered radiation from the model and the radiation which is reflected from the surroundings. The attack on this difficulty forms the present phase of our work.

Another approach which can be made is to find reasonable particle shapes, the scattering from which have analytical simplicity. These results may then be used as a means of gaining insight into the more difficult overall problem. It turns out, for example, that the scattering in W. K. B. approximation from an object of cylindrical symmetry whose faces are parabolic and whose index of refraction is real or complex is much simpler to calculate than that from a sphere. Calculations on the sphere were done in