Baum, W. A. A fundamental cosmological experiment for the artificial satellite.

The integrated light received at the surface of the earth on a moonless night can be ascribed to four general sources; namely, the glow of the earth's atmosphere, the zodiacal light, the light from objects within our own Galaxy, and the light from beyond our own Galaxy. This fourth contribution, the light from extragalactic sources, is of fundamental importance to the choice between possible models of the universe. Unfortunately, the night-air glow so completely dwarfs the other contributors that there is not the ghost of a chance of distinguishing the integrated brightness and color of the extragalactic contribution unless observations can be made with an instrument located outside the earth's atmosphere for a substantial length of time. The artificial earth satellites to be launched beginning next year provide the required opportunity.

There are several reasons why we should like to know the brightness and color of the extragalactic sky. (1) Different cosmological models predict different results. (2) One can imagine a universe fitting a particular cosmological model but not necessarily inhabited all the way to its horizon with the same density of galaxies. (3) The absolute surface brightness of regions between galaxies is unknown, because there is no reference to identify zero. In order to distinguish the effect of an intergalactic population from that due to the nature of the cosmos beyond the range of present telescopes, the brightness of the extragalactic sky should be observed in more than two colors.

The instrument required to make these observations can be extremely simple and compact. The proposed design includes a small lens, some tiny color filters, a red-sensitive photomultiplier, a radium-paint button for standardization, and a circuit about the size of a pack of cigarettes. Total power requirements of the system are less than a watt. The signal output, which is fed to a telemetering channel, consists of a stream of pulses whose frequency is an accurate measure of the light received.

The field of view, which is only a few degrees, is defined by a small diaphragm at the focus of the lens, and the accidental spin of the satellite swings this field of view through a conical sweep. As the satellite travels in its orbit around the earth, a varying portion of this sweep cuts across the luminous atmosphere of the earth while the remainder of the sweep cuts across the extra-

terrestrial sky. The cuts across the earth's atmosphere identify the satellite's axis of spin and its spatial orientation, while the variation of extraterrestrial brightness with galactic latitude provides the basis for estimating the extragalactic bias upon which the galactic contribution is superimposed.

*Mt. Wilson and Palomar Observatories,
Pasadena, Calif.*

Beals, C. S., Ferguson, G. M. and Landau, A. A search for lunar-type craters on photographs of the Canadian Shield.

As a result of a study of 200,000 photographs of a limited area of the Canadian Shield in southern Canada, two craters have been found, at Holleford and Franktown, Ontario, which may have had their origin in meteorite impact. Both objects have been deeply buried under paleozoic sediments which in one case have obscured and in the other nearly obliterated the original topography. Several other circular features have been noted for which meteoritic origin is a possibility although no studies of them have been made on the ground. The photographs have revealed several crater-like objects which have been attributed to volcanic action.

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Ottawa, Ontario.*

Bobrovnikoff, N. T. Systematic variations in the diameter of comets.

The study is based on 7596 observations, of which 575 were photographic, of the linear diameters of 300 comets reduced to 1788 normal places, giving an average of 4.2 observations per normal place. The intrinsic probable error of diameter determination by any one observer is very small, often of the order of one per cent. However, a combination of observations by different observers results in the average probable error of a normal place of 12.3 per cent.

It is found that up to 8'.5 of apparent diameter there is no systematic difference between the estimates of the diameter made by visual and photometric methods.

In order to study the variation of the diameter as a function of the heliocentric distance the very different average diameters of comets (from 6000 to 1,000,000 km.) were reduced to the adopted average diameter 100,000 km. This is not very far from the actually found average diameter of all 300 comets, 110,000 km. The final result