

dinations for insect detection and control was reviewed by F. R. Lawson, who also reported on research conducted by him and his associates of the U.S. Department of Agriculture. The highlight of this report was the success achieved in reducing populations of the tobacco hornworm by large-scale trapping experiments in which several hundred black light traps were used over an area of more than 100 square miles (260 km<sup>2</sup>). Another observation reported by Lawson which may have great significance was the marked increase in catch of male hornworm moths in light traps when unmated female hornworm moths were caged in close proximity to the light traps. Electromagnetic radiations in the infrared and far red regions of the spectrum may provide

the chief means of communication between insects of a given species in connection with reproduction, according to a theory advanced by P. C. Callahan (U.S. Department of Agriculture). He also expressed the view, with supporting data, that radiations given off by host plants or animals may represent the means whereby certain insects locate their host plants or animals. The theories advanced by Callahan should stimulate research on the influence of electromagnetic radiations on insect responses and behavior.

The symposium on pest control by chemical, biological, genetic, and physical means was broad in scope. Twenty-four topics were presented. These topics encompassed the research efforts now under way to develop al-

most every conceivable approach to the control of pests. The material presented clearly showed the desire of scientists with many agencies to obtain new information which will serve as a basis for maintaining and improving on the great advances that have already been made in meeting pest problems and at the same time assuring the achievement of this objective without undue risks to man and his environment. There is reason for optimism that significant progress can be expected in the practical development of various alternate ways to control pests. In all probability many major pest problems will also be met more effectively and safely in the future by properly integrating different systems of pest control.

E. F. KNIPPLING, *Chairman*

## Reports of Sections and Societies

### General Sessions

#### Possible Meteoric or Lunar Influences on Meteorological Phenomena

The interdisciplinary symposium on possible meteoric or lunar influences on meteorological phenomena (sponsored not only by the Physics (B) and Astronomy (D) Sections of the AAAS but also by the American Geophysical Union, the American Meteorological Society and the American Astronomical Society) advanced convincing evidence that (i) active freezing nuclei, with important meteorological consequences, are present in the lower atmosphere in spectacularly varying quantities, and they descend to the lower atmosphere from space or at least from an abundant reservoir at heights above 25 km, and (ii) lunar tide-producing forces manifest themselves as small but statistically significant changes in heavy rainfall frequencies at widely separated terrestrial stations.

E. Keith Bigg described experiments

to ascertain the origin and properties of freezing nuclei important in many cloud physical processes. The original "Bowen hypothesis" on the influence of meteoric dust on rainfall called for 10- $\mu$  particles capable of falling from high to low levels of the atmosphere in about 30 days. Bigg's work on actual particle collection reveals, instead, particles largely of submicron size which vary abruptly in concentration by factors of as much as 1000 times. The "ice nucleus storms" show no simple or consistent relation to local dust sources or small-scale surface weather conditions, nor are there decreases in numbers of freezing nuclei evident at greater heights. In fact, there is some evidence for substantial increases in volumetric concentrations above 27 km, and thus above the "ammonium sulfate layers" of Junge where freezing nuclei appear likely to be coated over with the soluble sulfate, and rapidly destroyed in freezing effect unless they can be transported rapidly downward.

Recent Australian experiments seem to suggest that just such rapid vertical

transport may indeed be responsible for the large pulses of freezing nuclei often found at lower levels.

Glenn W. Brier presented results of work done in collaboration with Donald A. Bradley and Max A. Woodbury which convincingly demonstrates a small but real influence of lunar tides on the frequency of occurrence of heavy rainfall. Using data from 1871 to the present, these painstakingly careful studies seem, on very conservative statistical grounds, to confirm the reality of an effect tending to produce greater frequency of heavy rainfall a few days after new moon and full moon in the lunar month—for all months and locations. Brier cautioned, however, that the effects involved represent only small perturbations on the average variability of rainfall. Thus, no matter how well established, they cannot at present add more than a minor additional factor to the prediction, for any given day, of the prospect of rainfall or for the magnitude of the expected fall. They are, however, of great significance to the understanding of the mechanism of large scale meteorological phenomena.

WALTER ORR ROBERTS,  
*Program Chairman*

#### Symposium on Medical Geology and Geography

Seldom can five people with such different backgrounds enjoy exchanging their experiences and points of

# Science

## Possible Meteoric or Lunar Influences on Meteorological Phenomena

Walter Orr Roberts

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