The antenna separation could be varied in steps giving fringe spacings from 18 to 2.2 minutes of arc. At a number of intermediate fringe spacings the intensities in different planes of polarization were measured. The maximum intensity obtained was with the electric vector in Jupiter's equatorial plane ($\pm 12^\circ$), and this intensity fell off more rapidly with decreasing fringe spacing than the orthogonal component, thus revealing stronger polarization in the *E-W* limbs of the radiating region. Two different methods of measuring the percentage polarization of the unresolved source gave means of 30 and 20%, respectively. In the absence of satisfactory theoretical models for the radiation belt, a comparison of the obtained amplitude-spacing curves was made with those expected from some simple intensity distributions. All of these indicated a diameter in excess of 2' of arc or three planetary diameters.

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The Production of Organic Molecules in Planetary Atmospheres. CARL SAGAN, *Yerkes Observatory, University of Chicago, Williams Bay, Wisconsin*.—It is now well known that when energy is supplied to a mixture of hydrogen, methane, and ammonia, or of hydrogen, methane, ammonia, and water vapor, organic molecules are produced. Both electric corona discharge and ultraviolet light, which have been successful as laboratory energy sources, are available in planetary atmospheres. Since hydrogen, methane, ammonia, and water vapor are the four most abundant reactive molecules in cold nondiffuse astronomical objects, it is probable that organic molecules are being produced in the solar system today, especially in the Jovian planets. For an organic molecule to be synthesized by solar ultraviolet light in a planetary atmosphere, and to avoid subsequent photolysis, the time for diffusion to depths optically thick in the photodissociating ultraviolet must be exceeded by the time between successive absorptions of photodissociating photons. From this condition, the experimental quantum yields of Groth, and recent theories of solar evolution, rates have been estimated for the net production of organic compounds in the contemporary atmospheres of the Jovian planets, and in the primitive reducing atmospheres of the terrestrial planets. The total surface densities of synthesized molecules during the lifetimes of these atmospheres are of the order of 1000 g cm⁻². Applications are made to the origin of life on earth, the reduced carbon fraction of the terrestrial crust, Sinton's identification of hydrocarbons and aldehydes on Mars, the discovery of complex organic matter in carbonaceous chondrites, and the composition of comets. The spectra of some of the more abundant synthesized molecules are described. An infra-

red spectrophotometric tracing of Jupiter by Kuiper shows a feature near 1.53 μ which is tentatively attributed to HCN.

Molecular Synthesis in Simulated Reducing Planetary Atmospheres. CARL SAGAN, *Yerkes Observatory, University of Chicago, Williams Bay, Wisconsin*, AND STANLEY L. MILLER, *School of Science and Engineering, University of California, LaJolla, California*.—Corona discharges have been applied to simulated reducing planetary atmospheres in an attempt to identify the most abundant stable compounds produced in the gas phase at room temperature. One mixture contained approximately equal amounts of hydrogen, methane, ammonia, and water vapor, and was intended to roughly reproduce the primitive atmospheres of the terrestrial planets. A second mixture contained hydrogen, methane, and ammonia in the proportions 30:3:1, and was intended to roughly reproduce the present Jovian atmosphere above the cloud layer. Extracted gas samples were analyzed by infrared and mass spectrography. Among the molecules which have been tentatively identified as being produced in both mixtures are ethane, ethylene, acetylene, hydrogen cyanide, and acetonitrile. In addition formaldehyde was produced in the experiment when water vapor was present. The production of these molecules in the simulated Jovian atmosphere disproves the assertion frequently encountered in the astronomical literature that more complex molecules cannot be produced from methane and ammonia in an excess of hydrogen. The possible presence of acetylene on Jupiter is exceptionally interesting because acetylene is known to explosively polymerize in the conditions of the Jovian atmosphere, forming a variety of compounds of high molecular weight, many of them brightly colored. The possibility of chemical reactions contributing to the Jupiter radio noise and of organic molecules explaining the coloration of the Jovian cloud layer are discussed. Pyrroles, purines, and pyrimidines—compounds of considerable biological interest—can under suitable conditions be synthesized from the products of these experiments. It has previously been shown that amino acids are produced by sparking a mixture of methane, ammonia, and water.

Mass Motions in the Atmosphere of Rho Cassiopeiae. WALLACE L. W. SARGENT, *Mount Wilson and Palomar Observatories*.—A study has been made of several 4.5 A/mm and 10 A/mm coude plates of ρ Cas, obtained at Palomar between 1955 and 1960. The phenomenon of line doubling reported by W. P. Bidelman and A. McKellar (1957, *Publs. Astron. Soc. Pacific* 69, 31) has persisted. An examination of about 150 doubled lines between λ 4000 and λ 6800