1959, *Mem. Soc. Astron. Ital.* **XXX**, 3-4) and may be related to the clear occurrence of the isotopic (0,2) violet *CN* band in Y CVn. The appearance of this band may not then necessarily indicate a higher abundance of C^{13} in Y CVn than in 19 Psc.

Characteristic Dimensions of Cosmic Aggregates of Matter. F. ZWICKY, *Mount Wilson and Palomar Observatories*.—If matter were made up of gravitating immutable particles, there would be no characteristic aggregates like stars and galaxies, but only swarmlike formations of matter whose distribution in sizes would be continuous and would depend on the average kinetic energy per gram of matter in the universe.

Because atoms consist of nuclei and electrons which react with one another and radiate, characteristic aggregates of matter are formed. Thus *stars* cannot grow beyond a certain size. They become unstable because of the effects of nuclear reactions. Likewise, *galaxies* cannot grow indefinitely because destructive effects limit the size of their nuclei. Indeed, within a nucleus of diameter d and containing per unit volume n stars of average absolute luminosity L , the radiation density will be of the order of $n L d/c$, if no gases or dust are present. This density, for increasing values of d and n , will become so large, particularly with gas and dust present, that it will cause the stars within the nucleus to "evaporate." This, incidentally, may also explain the steady outflow of gas from the nuclei of our galaxy and of Messier 31, this outflow being compensated by a continuous capture of stars from the outer regions of the galaxies.

Clusters of galaxies are also limited in size because

of destructive effects. As a cluster captures galaxies its kinetic energy increases to a point where the galaxies disrupt each other and the cluster loses mass by ejection of stars, dust and gas.

Going up the scale, the fact that clusters of clusters of galaxies do not exist might be caused by destructive effects as yet unrecognized, but the nonexistence of clusters of clusters of galaxies, however, is more likely due to a breakdown of Newton's law of gravitation.

Report on Supernovae. F. ZWICKY, M. L. HUMASON, AND H. S. GATES, *Mount Wilson and Palomar Observatories*.—A vigorous cooperative search for supernovae has been organized during the past few years including the Palomar and Steward Observatories, as well as the observatories in Berne, Switzerland and Meudon, France. The program in the United States is supported by a grant from the National Science Foundation.

About 20 supernovae have been found during the renewed search, confirming the general results derived from the original Palomar program of 1936-1942.

Valuable results have been obtained on the general frequency of supernovae, on their occurrence and locations in the various structural types of galaxies, on their spectra and their light curves, which eventually should aid in interpreting the fundamental phenomena involved in supernova outbursts. A special effort has been initiated with the 48-inch and the 200-inch telescopes to find supernovae in very distant clusters of galaxies for the purpose of establishing a more reliable distance scale.