down to about 18th magnitude on an additional 608 stars; however, the photoelectric limit is $V=17.0$. Fine structure is exhibited by the stars above the vertical main sequence and a slightly fainter red offshoot is found. A sequence of stars is found in *apparent* gravitational contraction but with main-sequence stars extending, nevertheless, to the observational limit. At present the data are best represented by theories of gravitational contraction, hydrogen-burning, and helium-burning, together with a non-unique epoch of stellar condensation. Contraction and nuclear time scales for the different features are compatible. The differences in apparent evolutionary tracks between the Galaxy, LMC, and SMC are reconfirmed. The two-color diagram of the bluest stars is of a blackbody character. Sp vs $(B-V)_0$ is monotonic for all stars. The M supergiants are shifted redward over previous studies and form a steep two-color relation.

Thermodynamics of the Gray Atmosphere. RUPERT WILDT, *Yale University Observatory*.—The classical problem in radiative transfer is to find the source function sustaining strict radiative equilibrium in a gray atmosphere. That restriction, owing to the linearity of the monochromatic transfer equation, has made it possible to detach study of the conservation of radiant energy from inquiry into its spectral composition. The latter commences with an appeal to Planck's generalization, for nonequilibrium radiation, of Wien's displacement law. For every pencil of radiation inside a gray atmosphere in strict radiative equilibrium, energy spectra characteristic of different effective temperatures (net fluxes) are linked by a certain similarity transformation, provided that the source function, which need not be Planckian, undergoes the identical transformation; and vice versa. Analogous displacement laws hold for the concomitant changes in spectral distribution of radiant entropy and of the entropy source function. The physical correlate these similarity laws have in common are quasistatistical processes that convey, by a finite change of the net flux, the radiation field of the gray atmosphere, i.e., a nonequilibrium system, from one steady state to another. Because they satisfy all appropriate criteria, it is well within the bounds of accepted usage to call them reversible adiabatic processes, a term reserved in classical thermodynamics for passage through a sequence of equilibrium states.

The complete distribution, throughout a gray atmosphere, of the spectrum of the source function accrues from a tentative extremum principle replacing arguments from thermostatics. Minimization of the global entropy deficit of the source function (a quantity identically nought in LTE), under the constraints that strict radiative equilibrium is preserved at all levels and that the photon flux escaping at the surface remains invariant, yields the Kothari-Singh function. It differs from the Planck function by an additive parameter related to the nonvanishing free enthalpy of nonequilibrium radiation. Since the new parameter varies proportional to the second exponential integral of the optical depth, LTE is reached asymptotically. This event disposes of a conjecture (Wildt, R., *Astrophys. J.* **123**, 115, 1956) which had left the march of the parameter undetermined.

Tentative Observational Confirmation of Discretization in Galaxies. A. G. WILSON, *The RAND Corporation*.—Images of early elliptical galaxies on 200-inch plates of the Coma, Ursa Major I, Corona Borealis, Bootes, Ursa Major II, and Coma B clusters were measured and reduced to quantities qualifying as proper diameters in the sense that, considered as measures of angular diameters, they exhibit inverse proportionality to distance. The reduction of the measurements to proper diameters was made by calibration against cluster redshifts.

The theoretical distribution function of diameters of true E0 galaxies, according to the Edelen theory, will be such that they occur at discrete intervals proportional to the sequence $[n(n+1)]^{\frac{1}{2}}$, where n is a positive integer. The observed proper diameters, normalized to uniform distance by relative redshifts, corresponding to apparent E0's were found to exhibit a distribution structure consistent with the predicted structure to within the observational errors.

The initial operational definitions of diameter used were micrometric, based on direct measurements of the photographic images of the galaxies, and microphotometric based on luminosity profiles.

On the basis both of the importance of the implications of the Edelen prediction and of the tentative nature of this initial observational demonstration, it is felt that adequate justification now exists for the design and implementation of further observational tests for discretization phenomena.