could be fitted very well to theoretical profiles computed on the assumption of a source function constant in frequency across the line and constant in depth in the prominence. The same remarkable agreement has been obtained for our observations, except of course, for those cases where the $H\alpha$ line is self-reversed. For subordinate lines like these, it is almost certain that the source function is in fact frequency independent. The good agreement obtained between the observed profiles, and those computed on the assumption of a source function constant in depth, however, is probably largely fortuitous. It seems that almost any monotonic source function could be fitted by one of the family of curves. In any case, the occurrence of double-peaked profiles in $H\alpha$ shows that for this line the assumption is not generally valid.

In order to test this assumption further, the optical depth at the center of the $H\alpha$ line has been computed from the run of widths of the Balmer lines $H\beta$ through $H\epsilon$. This method was found to give a higher optical depth than that implied by the shape of the $H\alpha$ line using the assumption of a source function constant in depth. It seems clear that the usual method of estimating prominence temperatures from the $H\alpha$ profile is very unreliable.

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King, Ivan. The dynamical lifetime of a star cluster.

It is well known that a cluster will eject stars as a result of encounters between its members. It has also been recognized that the cluster will consequently contract and the contraction will increase the rate of ejection. The purpose of the present paper is to calculate the effect of the contraction on the lifetime of the cluster. The starting point is the instantaneous rate of ejection of stars, as calculated by Ambartsumian (1938), Spitzer (1940), and Chandrasekhar (1943), who have shown that the cluster loses just under one per cent of its stars in a time equal to the time of relaxation. This principle can be combined with the theory of the time of relaxation, the law of conservation of energy, and the virial theorem to give a differential equation for the number of stars in the cluster as a function of time. The equation is easily solved.

The solution depends slightly on the assumption made about the amount of energy that the escaping stars carry away. It is shown to be reasonable to assume that they carry away zero energy; this assumption sets an upper bound on the life of the cluster.

The resulting evolution of the cluster may be compared with the exponential decay that would follow from assuming that the time of relaxation remains constant. For an exponential decay the time required for half the stars to escape is $93 \tau_0$, where τ_0 is the initial time of relaxation; while consideration of the contraction reduces this time to $39 \tau_0$. The corresponding times required for nine-tenths of the stars to escape are $300 \tau_0$ and $42 \tau_0$.

All these time intervals are inversely proportional to the initial instantaneous rate of ejection of stars. Any future refinements in the theory of the ejection rate will change the estimate of the lifetime of a cluster but will not affect the conclusion that its lifetime is considerably reduced by evolutionary contraction of the cluster.

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Osterbrock, Donald E. Parallel filamentary structure in diffuse nebulae.

Several diffuse nebulae are described in which parallel filamentary structure is observed in emission. The nebulae are IC 434, the filamentary structure of which was first described by Duncan, NGC 1499 and NGC 2327. In all three cases there is an O star responsible for the ionization of the nebula, with a dark cloud of unionized material to one side of it. The ionized matter, seen in emission, lies mostly between the dark cloud and the star, and is sharply bounded on the side of the cloud by a bright rim, while on the other side it fades out gradually, extending in some cases beyond the star. The parallel filamentary structure begins at the bright rim, to which it is approximately perpendicular.

These nebulae are evidently cases in which an O star ionizes one side of a relatively dense cloud, causing the ionized material to expand into a near vacuum. The parallel bright filaments must result from regions of high density in the original