Milkman, R. and M. Kratoska. University of Iowa, Iowa City. Cage Drosophila go away to die.

Eleven standard 20-vial Lucite cages were established from one inseminated female (derived from a common cage) each. The terminal pair of vials was left empty. Dead and dying flies accumulated there primarily. An array of experiments has been undertaken to investigate the possibility that old and otherwise "inferior" flies flee or are driven away from food vials and the flat cage surfaces. These include the following: 1) Food vials were removed and the medium searched. Very few adult remains were seen (when food pulls away from the side, many flies are often trapped; this is a frequent but unnecessary occurrence). The floors of the eleven cages revealed a total of four dead flies over several days, while scores of flies accumulated in the death vials. 2) Death vials were left in the cage for varying periods. Accumulation of dead flies was roughly linear; number of "dying" flies (from normal-looking to paralyzed) remained constant. 3) Over 400 "dying" flies and over 400 "normal" flies attracted from the main part of the cage with light were placed in food vials, 20 flies per vial. The "dying" flies' median survival time was 26 days; normal flies', 52 days. The "dying" flies were essentially all fertile (both sexes) in additional tests, with the exception of those that didn't survive etherization. 4) Under these conditions (room temperature, about 20 flies/vial), 348 normal cage flies had a median survival time of 23 hours in plugged empty vials (maximum 71.5 hours). 5) Six vials of marked (n b cn bw) flies were substituted at once for a period of three days in each of two cages. Of the 167 eventually appearing in the death vials, 64 appeared in the first 3 days, and the rest appeared sporadically in declining numbers until 40 days later, after which none appeared. 72 were found in the cage food vials that were removed on regular schedule, of which all were alive. 6) Half of the producing food vials were removed from each of two cages; emergent flies were counted daily for three days, leading to an estimate of emergence per day of 86 and 198, respectively. The cages were censused by direct count and mean adult longevity computed to be 1570/86 = 18 days for one cage and 4010/198 = 20 days for the other. 7) The remaining 9 cages, similarly censused, averaged 2468 flies (range: 1850-3355). With a mean adult longevity of 19 days, a mean daily death (and emergence) rate of 130 is indicated. The mean daily death rate observed in the death vials over a three-month period was 60.

The use of marked strains in cages and in two- and three-vial connecting sets has been undertaken to explore the possibility of determining (transient) behavioral dominance hierarchies and using these status values to permit selection for longevity (result of discussion with F.A. Lints) and other difficult traits. We assume that any two laboratory cultures will each contain flies with a wide range of vitality and so overlap to a degree preventing absolute separation of strains by the emigration of one strain from a mixture. Preliminary results are consistent with this view, although differential emigration is evident. Prescreening to narrow the vitality range will be employed in future experiments. These emigration experiments differ from those of previous investigators in that flies migrate to an empty vial, with no food.

When cages contain no empty vials, the newest food vials contain very large numbers of males and females. Many of these are dead and dying, so that in ordinary cages each food vial serves as a graveyard (as well as a nursery simultaneously) in its turn. This phenomenon is likely to have something to do with the fact that cage flies are sizable and vigorous, rather than scrawny and weak, as they would be if an essential nutrient limited population size directly.

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distribution.

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