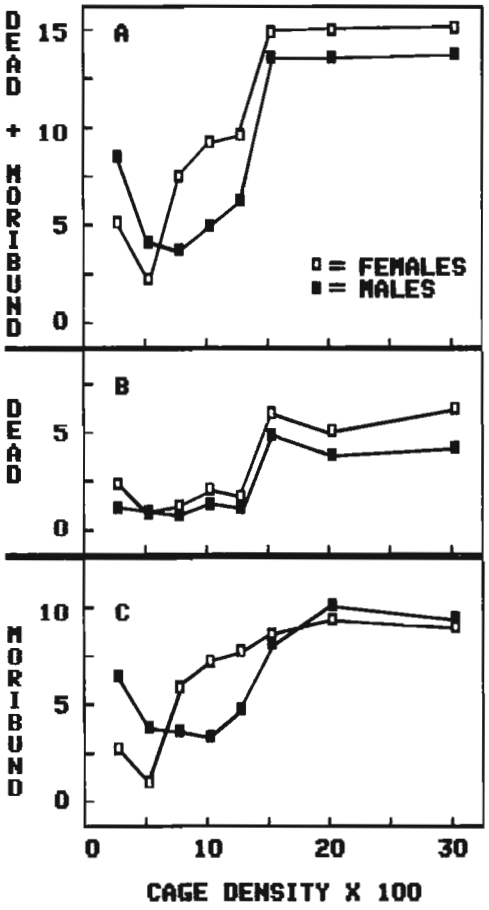

Figure 1. Components of death rate (average %).

The effect of varying cage density on the overall death rate (% dead + moribund) is shown in Figure 1A, where the individual points represent the average of three trials at each density. With the exception of the lowest cage density, 250 flies/cage, increasing density causes an increase in overall death rate up to 1500 flies/cage. At that density, and above, the overall death rate is constant. Females and males differ significantly in overall death rates from 750 through 1250 flies/cage, and at the lowest density, 250 flies/cage, where a very small numerical difference results in a large rate difference. Separation of the two components of death rate into the average % dead and the average % moribund revealed two things. (1) There are two percentage rates of dead flies, one below 1500 flies/cage where there is no significant difference between males (1.33% dead) and females (1.71% dead); and a second rate at cage densities of 1500 flies/cage and above where the average rate for males (4.17%) is significantly different from that of females (5.78%) (see Figure 1B). (2) The sex differences in the overall rate are due to differences in the average % moribund flies below cage densities of 1500 flies/cage (see Figure 1C).

With increasing cage density, two things appear to occur. First, an overall increase in the number of flies emigrating to the death vials at densities up to1500 flies/cage occurs. Secondly, at high densities, 1500 flies/cage or higher, the rate of emigration to the death vial remains constant, but a much higher percentage of dead flies is found in the death vial. This second event may in part be due to the marked increase in absolute numbers of flies in the death vial, a large increase in numbers could cause physical trampling of weaker individuals resulting in their death. The absolute number of flies in the death vials almost doubles between the densities of 1250 (112 flies in the death vial) and 1500 (212 flies in the death vial) and it is at this point that the % dead increases markedly.

From other studies, we know of several other things which will affect the rate at which flies emigrate to death vials. (1) Different mutants have different rates, mutants which confer poor optimotor behavior usually lead to a marked increase in rate, e.g., the mutant ebony (e) has a very high rate. (2) Locomotor activity of flies. Flies with high rates of activity are less likely to be found in the death vial than those with lower rates of activity. In part this accounts for the difference in the male-female emigration rate to the death vial at cage densities between 750 and 1500, as males are more active than females at seven days and apparently escape the death vial more readily. Activity rate may also explain why at low densities (500 or below) more males are found in the death vial; being more active, a male may find himself in such a space, while exploring the cage, and once there may not escape.

Reference: Milkman, Roger 1975, Biol. Bull. 148:274-285.

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A semibalancer system for detecting third chromosome two-arm synthetic lethals in **D.melanogaster.**

To facilitate the detection of two-arm synthetic lethal third chromosomes (synthetic lethals with components in each arm of the metacentric third chromosome), we have developed a "semibalancer" system. It utilizes the old-fashioned third chromosome balancer Me Sb [In(3L)P In(3R)C, Me Sb e I(3)e] in combination with structural heterozygosity for the first chromosome balancer Inscy. The left and right arm inversions suppress third chromosome intra-arm recombination while the first chromosome structural heterozygosity increases crossing over in the centromeric region that is free to recombine.

Table 1. Third chromosome recombination in females heterozygous for the Inscy and Me Sb chromosomes. Frequencies based on counts of 525 offspring for intervals to the left of th and counts of at least 196 offspring for intervals to the right of th. Male offspring hemizygous for Inscy were excluded from the counts.

Map position	0.2	20.0	26.5	43.2	50.0	58.2	62.0	79.1	91.1	100.7
Marker	ve	Me	h	th	cu	Sb	sr	bar-3	ro,tx	ca
% Recombination	0.0	0.0	0.0	10.2	4.1	0.5	0.0*	1.1	0.0	

* Estimated from the Sb-ca recombination value in conjunction with the other values given.

Table 2. The nature of lethality as revealed by classes of recombinant progeny (excluding individuals that exhibit Ser and thus carry TM3).

Recombinant progeny classes present	Nature of lethality
Me	left arm lethal
Sb	right arm lethal
Me & Sb	two-arm synthetic lethal*
neither	left and right arm lethals

*This pattern is also consistent with the presence of a lethal in the th-sr interval, so that conclusive evidence for existence of a two-arm synthetic lethal will require further analysis.

A perfect semibalancer chromosome system would exhibit no recombination within arms but free recombination between arms. Approximate third chromosome recombination frequencies for Incsy/+; Me Sb/-- females appear in Table 1. These frequencies are based on observed recombination with third chromosomes of genotypes ca, ve h th, bar-3 tx, ve h sr e^s ro ca, and ve h th cu sr e^s ro ca. The latter two chromosomes bear a recessive lethal. Note that recombination is very low in the right arm and absent in the left arm, but about normal in the th-Sb interval which contains the centromere (at map position 46.0).

The use of this system to detect two-arm synthetic lethals involves three steps: (1) the production of female Incsy/+; Me Sb/lethal double heterozygotes, (2) the crossing of these females to +/Y; TM3, Sb Ser/lethal males, and (3) the scoring of their offspring for the presence of Me, Sb and Ser. Excluding the Ser progeny (which carry the TM3 balancer), the absence of Me recombinants indicates a right arm lethal, the absence of Sb recombinants indicates a left arm lethal, and the absence of both indicates independent (non-synthetic) lethals in both arms (Table 2). The presence of both Me and Sb recombinants indicates a two-arm synthetic lethal (or a centromeric lethal). Because hemizygosity for the Incsy chromosome sometimes suppresses the expression of Ser, sc y male offspring must be omitted from the progeny counts (a nuisance that might be avoided by substituting TM6 for TM3). Using the system, the lethal associated with the multiply marked chromosomes ve h sr e^s ro ca and ve h th cu sr e^s ro ca proved to lie in the right arm to the right of Sb.

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Another new arrival to the Hawaiian Islands: **Drosophila bryani** Malloch.

In December of 1984 a male Drosophila was collected in Honolulu behind the University of Hawaii in Manoa Valley. The collection site was under a Chinese banyan tree **Ficus microcarpa** L.S. situated immediately behind the Biomedical Sciences Building at the University. This fly was collected using banana bait in a ground-level container. The fly died shortly after collection. External characteristics indicated that it belongs to the subgenus **Scaptodrosophila.** These characteristics include one pair of enlarged prescutellar acrostichal bristles and a minute pair of second oral bristles. This fly was kindly confirmed for us to be of the species **bryani** by Dr. Ian R. Bock. **Drosophila bryani** has one sibling species, **dicrhomos** Bock, described from Queensland, Australia. It is distinguished from **bryani** by minute genitalial differences.

A female specimen was collected from the same site within two weeks of the male. This female died without laying eggs. Attempts to collect further specimens have not been successful.

The known distribution of **bryani** includes most of Micronesia from Saipan south to Guam, Yap, Palau, the Carolines, Ponape, Kusaie and the Marshall and Gilbert Islands. It is also found in the Philippines and Australia. **Drosophila bryani** has not previously been found in Hawaii and thus these two specimens represent a new record for the islands. This species, the first of the subgenus **Scaptodrosophila** to be recorded, brings the total number of exotic species of the family Drosophilidae in Hawaii to 26: 17 of these belong to the genus Drosophila.

References: Bock, I.R. 1976, Austr. J. Zool. Suppl. Serv. No. 40:1-105; Wheeler, M.R. & H. Takada 1964, Insects of Micronesia 14(6):163-242.