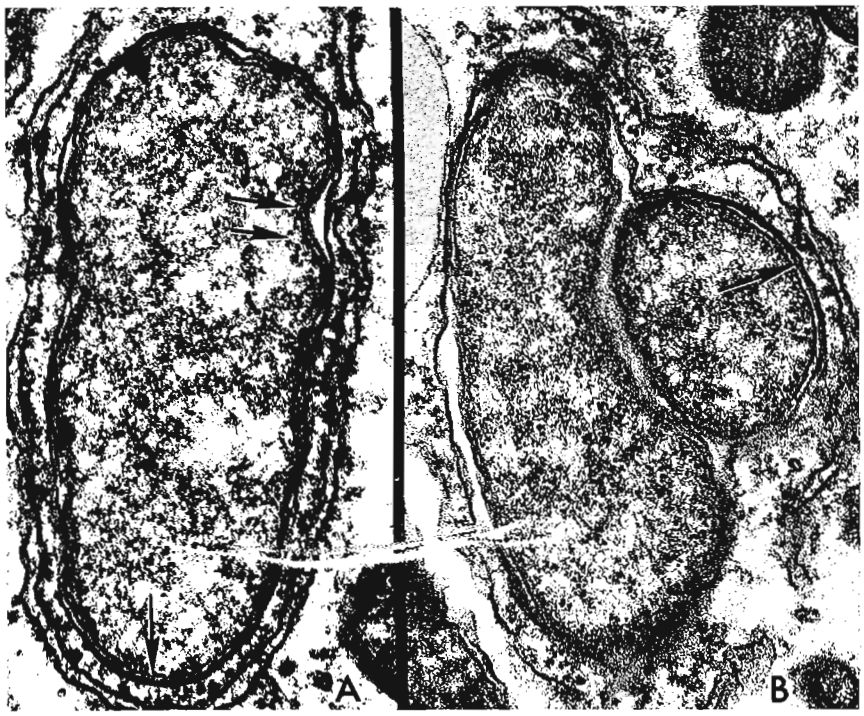
Kernaghan, R.P. SUNY at Stony Brook, New York. The ultrastructure of the organism associated with hybrid sterility in D. paulistorum.

Crosses between some semispecies of D. paulistorum produce sterile F_1 male offspring. Usually a cross between Mesitas females X Santa Marta males produce fertile F_1 male progeny but in recent years the male progeny are sterile as if the ability to produce sterile offspring has been acquired. At the electron microscope level, the testes of these males are congested with degenerating sperm and contain a microorganism or symbiont similar to that previously described by Kernaghan and Ehrman (1970). In addition, extracts prepared from such infected tissue are potent in inducing sterility in the sons of recipient females (Williamson, Ehrman and Kernaghan 1971).

High resolution analysis of testes of these sterile F_1 hybrid males, as well as developing eggs of their fertile sisters and mothers shows a cytoplasmic membrane limited vacuole enclosing one or more of the symbionts. In addition, each microorganism is limited by two membranes. The outer membrane may be juxtaposed to the vacuolar membrane to produce a more electron dense region (Figure A & B). The internal structure of the organism is described as a reticulate network of fibers and may or may not be accompanied by a rough peripherial granulation of ribosome-like material. Pleomorphic forms are not unusual ranging from a smaller dense granular form .1 μ in diameter to the larger reticular form .3 to .5 μ in diameter.



Electron micrograph of the reticulate form of the microorganism in the sterile F_1 male testis from a cross Mesitas females X Santa Marta males. Figure A, (upper arrows) show the duplicate membranes of the symbiont while Figure A, (lower arrow) and Figure B demonstrate the juxtaposition of the external membrane to the vacuolar membrane. 90,000X

Penicillin has no detectable effect on the ultrastructure of the symbiont. Both external membranes remain intact when such sterile F_1 hybrid males are raised on drug treated media. Large reticulate forms are common in these treated individuals. In adult tissue the symbiont has been detected only in the gonads while in some cases larval and pupal gut muscle exhibit the microorganism.

On the ultrastructural level alone, no clear assignment may be made as to the type of organism involved. Although a general similarity to mycoplasma-like morphology exists, the ultrastructure of a Rickettsia described by Briton and Burgdorfer (1971) or the fine structure of Chlamydia by Tamura et al (1971) is equally applicable.

References: Kernaghan, P. and L. Ehrman 1970 Chromosoma 29:291-304; Williamson, D., L. Ehrman and P. Kernaghan 1971 P.N.A.S. (in press); Brinton, L.P. and W. Burgdorfer 1971 J. Bacteriol. 105:1149-1159; Tamara, A., Matsumoto, A., G.P. Manire and N. Higashi, 1971 J. Bacteriol. 105:355-360.

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Lefevre, G., Jr. San Fernando Valley State College, Northridge, California. Crossing over in an insertional translocation.

A cytogenetic analysis of some EMS-induced sex-linked lethals unexpectedly revealed an insertional translocation in which a segment of X extending from 1D1-2 to approximately 5C5-6, i.e., from su (w^a) through cv, was inserted in direct order near the tip of 3R, just before 100E1. This translocation, designated as T(1;3)SFV-70k, is illustrated in Fig. 1. The aneuploid deficiency segregant is lethal as a heterozygous female; the duplication segregant survives as a fertile female, but is lethal as a male.

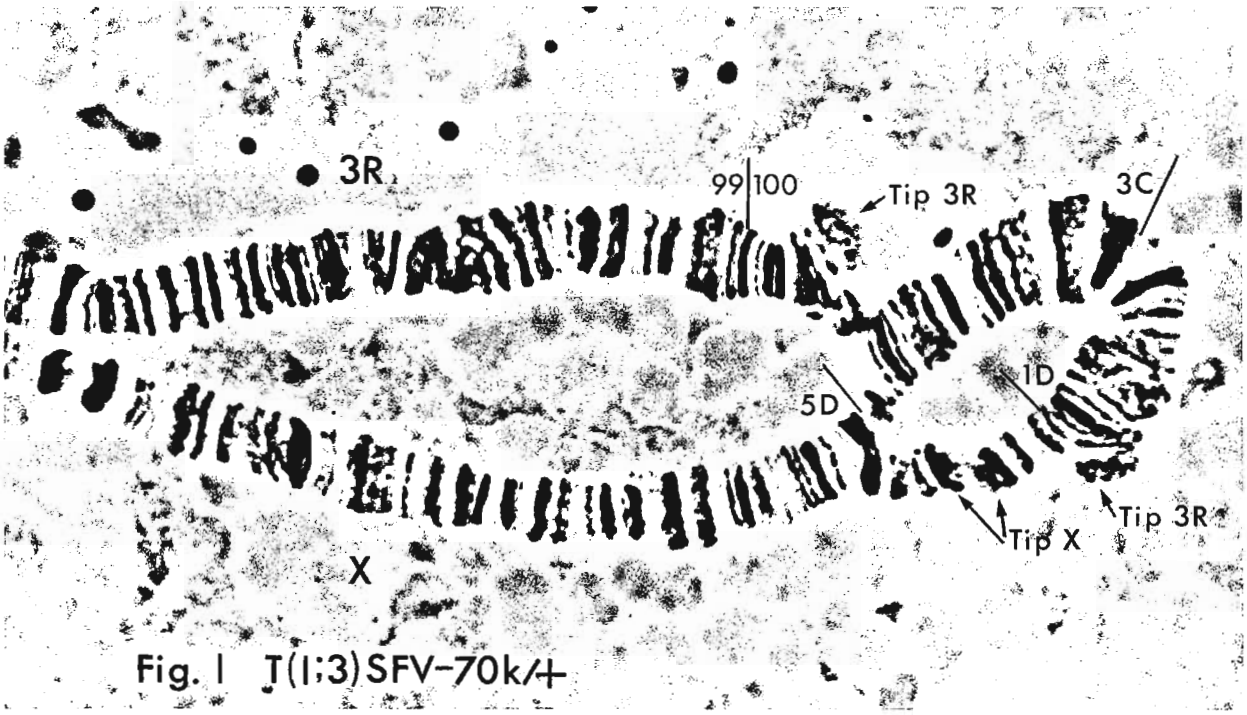

Fig. 1 T(1;3)SFV-70k/+

Because of the favorable orientation and location of the inserted material, an attempt was made to recover a single crossover between it and a normal, marked X. Although only a portion of such crossovers should be identifiable, a total of 4 were found among 2,551 daughters of $T(1;3)/y^2$ w^a ec cv ct f females. Each of these recombinant daughters carried one T(1;3) chromosome in which the original insertional translocation had been converted by the single crossover into a reciprocal translocation. However, only a half-translocation was recovered in each recombinant fly. (Although the full reciprocal translocation can be recovered in a single individual, it should not be recognizable as a recombinant.)

The successful recovery of these crossovers demonstrates that effective synapsis does not require a zipperlike action initiated only at the telomere or centromere, but is compatible with the view of von Wettstein (PNAS 68:851-855, 1971) that precise synapsis between homologous elements can be initiated at any point.