Dear Joshua,

Spencer gave me your question "Is there any connection between this and Bommar & Linning's results (Hereditae 1944-52)?" to answer. Sorry it's so late.

There are two aspects to the question, aging and cause of loss of chromosome.

Aging and reciprocal loss: Our work agrees with Bommar & Linning's in that aging does increase the incidence of gynandromorphism. The difference is only indicated in this work as well as Patterson's (1931) because they were using only red chromosomes and the rate of incidence is very low. The difference between aged and non-aged is ours is highly significant perhaps because of the naturally higher rate or perhaps because the aged maternal cytoplasm has more effect on the red chromosome.

We too found differences between reciprocal crosses but in contrast to Bommar & Linning only we incidence of ring loci, not sex and red. However there is a low incidence of red loci in red ring genotypes and it may be that if we had larger numbers we would be able to detect this. Balancer fox 1949-50 (see Ray & Ed. Edinburgh) reports differences in ring loss in different genotypes. I am just now doing crosses and calculating data. We thus:

2. Cause of loss of chromosome: Bommar & Linning attribute loss to (a) single breaks in male (irradiated) chromosome and to (b) "detrusion of the meiotic mechanism of the egg cytoplasm which presumably acts on the movement of the chromosomes in the first division metaphase." Their first (a) we cannot argue because we did not irradiate. I know from work in Muller's lab that there is a pretty high incidence of gynandromorphs (loss of X20) after irradiation of the X. I am inclined to believe that a large part if not all of this was due to aging of the females before mating.
(We collected them over a period of seven days) and probably not due to breakage of the ring by the X-rays.

I do not agree entirely with B & L on the second point ie...

"1st cleavage of oocyte". However this is in part my inclination to idea that if the loss occurs at the first cleavage, the gynander will be lethal and if at later cleavages, only part of the individual will be mosaic. My other theory is that the amount of X tissue will depend upon the angle of the metaphase plate at the first cleavage. This is an assumption I can see no exceptions that have occurred only once. But all available data suggests that loss may occur later as well as at the first division. This in a point we are worried about ourselves in several cases. Logically I don't see how there could ever be a bilateral gynander because of the method of nuclear and cell formation. All nuclei are formed first in the middle of the egg then they move to the periphery and cell walls are formed. It seems to me that the jelly should be spotted for X or Y tissue - but they aren't.

If loss occurs at the first cleavage and is due to misfiring of the karyokinetic mechanism then it seems to me that instead of gynanders the individuals should be males. Why is the only one ring lost? And if it has already become two chromosomes before entering the egg, or if the cytoplasm causes misdivision of the ring (so that it becomes a dicentric for example) both ridge would again be lost. There is some evidence that there are proportionally more males than females after aging but this is not true that this is due to an increase of X0 males (resulting from loss of the ring on both parents) or X0 males (resulting from loss of the ring on one parent). I am testing this now. It may be that gynanders or sex ratios do not derive as well as females or XY males.

If I haven't answered your question I would be more than glad to correspond in greater detail with you about it.

My best regards to your wife and everyone at Wisconsin.

Cecil A. Hannahan