

UNIVERSITY OF CALIFORNIA

DEPARTMENT OF ZOOLOGY
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Dear Joshua

Spencer gave me your question "Is there any connection between this and Bonnier + Luning's results (Hereditas 1949, 52)?" to answer. Sorry I've been so late.

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

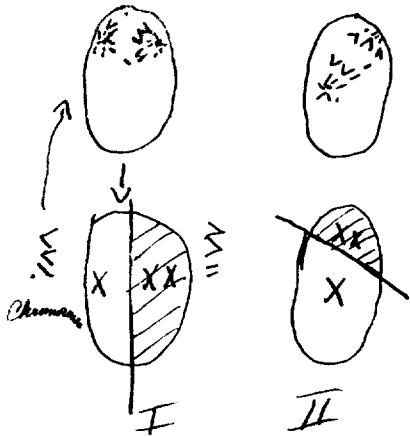
(a) Aging upon ring loss: Yes our work agrees with Bonnier + Luning's in that aging does increase the incidence of gynandres. The difference is only indicated in their work as well as Patterson's (1931) because they were using only rod chromosomes and the rate of incidence is very low. The difference between aged and non aged in ours is highly significant perhaps because of the naturally higher rate or perhaps because the aged maternal cytoplasm has more effect on the ring chromosome.

(b) We too found differences between reciprocal crosses. but in contrast to Bonnier + Luning only in incidence of ring losses - not ring and rod. However there is a low incidence of rod loss in X rod ring genotypes & it may be that if we had larger numbers we would be able to detect this. Ballacharya 1949-50 (Proc Roy Soc Edinburgh) reports differences in ring loss in ~~rod~~ different genotypes. I am just now doing crosses + calculating data on this.

2. Cause of loss of chromosome: Bonnier + Luning attribute loss to (a) single breaks in male (irradiated) chromosome and to (b) "disturbance of the karyokinesis mechanism of the egg cytoplasm which presumably acts on the movements of the chromosomes in the first cleavage mitosis". The first (a) we can't argue ^{along} because we did not irradiate. I know - from work in Muller's lab - that there is a pretty high incidence of gynandres (loss of X^{00}) after irradiation of the X^{00} but I'm inclined to believe that a large part of this was due to aging of the females before mating.

(we collected them over a period of several days) and probably not due to breakage of the ring by the X-rays.

I do not agree entirely with B & D on the second point i.e. ... "1st cleavage of mitosis." However this is in part my inclination to idea that if the loss occurs at the first cleavage the gynander will be ^I bilateral and if at later cleavages only part



of the individual will be mosaic. The other theory (II) is that the amount of 1-X tissue will depend upon the angle of the metaphase plate at the first cleavage. This as near as I can see presupposes that loss occurs only once. ~~But~~ all of our data suggests that losses do occur later as well as at the first division. This is a point we are worried about ourselves for several reasons. Logically I don't see how there could ever be a bilateral gynander because of the method of nuclei +

cellular formation. All nuclei are formed first in the middle of the egg then they move out to the periphery and cell walls are formed. It seems to me that the ~~folly~~ should be spotted for ♀ + ♂ tissue - but they aren't.

If loss occurs at the first cleavage and is due to malfunction of karyokinetic mechanism then it seems to me that instead of gynanders the individuals should be ^{XO} males. Why is ~~the~~ only one ring lost? ~~If it has already become two chromatids before entering the egg?~~ or if the cytoplasm causes mis-division of the ring (so that it became a dicentric for example) both ridges would again be lost. There is some evidence that there are proportionally more males than females after aging but I'm not sure that this is due to an increase of XO males (resulting from loss of the ring or both rings). I am testing this now. It may be that gynanders or mosaics do not survive 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

Aloha Hannah.