

olated with feeble reactions for alkaline phosphatase though there is an increase of the reaction in the mesenchyme cells round the perichordal tube and the hypochord. The hypochord becomes small in size and undergoes fusion with the perichordal tube. In the limb bud stage, the sclerotome cells become plastered round the perichordal tube to give an intense reaction for the enzyme. The hypochord becomes very small with a limited number of cells. The outer regions of the cell membranes show an increased reaction though the cytoplasm of the cells is practically devoid of the enzymatic actions. The hypochord gradually merges with the perichordal tube of the notochord and is not detectable in an adult with fully regressed tail.

Discussion. The hypochord thus may be regarded as an accessory structure to the notochord and comes out of the hypodermis when chorda is fully differentiated and prior to the appearance of the perichordal tube. SPRATT⁶ is also of the same opinion that it is hypodermal in origin. It remains as a transitory structure and the development is very much similar to that of the notochord, including sheath formations and vacuolations; gradually it becomes fused with the perichordal tube. Subsequently, the mesenchyme cells migrate beneath the hypochord. Thus, a very high order of contact specificity⁷⁻⁹ develops amongst the cell surfaces of the perichordal tube and hypochord proper, resulting in a complete fusion of these two structures. The hypochord cells at first show less reaction for alkaline phosphatase, but gradually the reaction increases until the vacuolations start. With the commencement of chondrification, there is an increase in the reaction for

alkaline phosphatase in the surrounding mesenchyme cells – a feature which is very similar to that of a bird¹⁰. Along with this there is an increase for the localization pattern of the enzyme, particularly in the intercellular regions. Later, when the structure becomes fused with the perichordal tube, the cells are without any reaction though it increases on the outer side of the cell membrane – a phenomenon associated with the ossification of a structure¹¹. The hypochord thus may help in the formation of the ossified vertebral area in the anurans.

Résumé. L'hypocorde des Anoures est d'origine endodermique. Sa réaction à la phosphatase alcaline s'accroît graduellement jusqu'à l'apparition des vacuoles. Au cours de sa fusion avec le canal périchondral, une réaction à l'enzyme s'observe à la surface externe de la membrane cellulaire. L'hypocorde peut aussi contribuer à la formation des vertèbres.

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Some Meiotic Consequences of Ethyl Methane Sulphonate and the Interaction of Copper or Zinc

The interaction of several cations on the chromosome breaking activity of EMS has been demonstrated^{1,2}. Copper and zinc salts were found to enhance the primary effects of EMS in broad beans considerably. The effect of copper was confirmed for wheat³.

It becomes evident that some ions can increase or decrease the activity of mutagenic compounds. Even low pH can modify the effects⁴. Modifications produced by various factors are not limited to monofunctional compounds of the mesyloxy group. It could be proved that the interaction still exists for bifunctional or trifunctional compounds of the same group, although less evident⁵. The mechanism by which ions can interact with alkylating agents is not yet clearly understood.

We reported that dry seed treatments with EMS can result in meiotic consequences which could, at least partially, explain the high sterility induced with this compound⁶.

Continuing the investigations along this line of research, we intended to see if these meiotic consequences could be modified in some way by ions.

In the present experiments, barley dry seeds (piroline variety) were treated with EMS (0.3 g per 100 ml for 24 h) and with EMS solutions of the same concentration respectively added to CuSO₄ (0.03 mg per 100 ml) or ZnSO₄ (0.03 mg per 100 ml water), pH around 6.5.

In previous experiments, these concentrations were found to modify the action of EMS on mitotic chromo-

somes^{1,2}. In the present experiments, spikes of the generation X1 were collected for meiosis examination. Chromosomes were stained with Feulgen and observed on squashes.

All kinds of aberrations reported after X-ray treatment could be detected in the slides. We mainly noted the following aberrations. At metaphase I they consist of rings of four, rings of six, chains of four and figures of eight, all these abnormalities arising from chromosome translocations and small chromosome fragments coming from deletions. At anaphase I, the aberrations consist of chromosome and chromatid bridges and lagging fragments of multiple origins.

At anaphase II, we noted lagging fragments, micronuclei and a few bridges. After treatment with solutions to which copper and zinc were added, the aberrations were qualitatively essentially similar as after treatment with solutions without one of these salts. Controls performed in the same experimental conditions show a low amount of chromosome fragments at anaphase I. No other abnormality could be seen.

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The proportion of the different aberrations was analysed (Figures 1 and 2a and b).

In the above-mentioned experimental conditions, neither copper nor zinc increased the amount of damage in meiosis of the generation X1. However, the proportions of several kinds of aberrations were different for the three treatments.

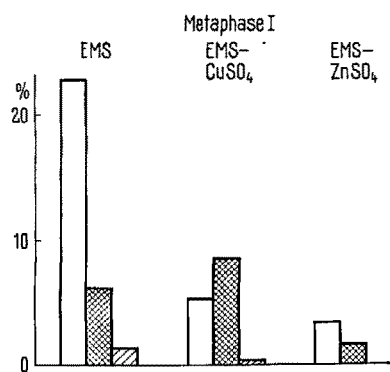


Fig. 1. Percentages of aberrations observed at metaphase I (± 300 metaphases; EMS conc. 0.3 g/100 ml; CuSO₄ or ZnSO₄ conc. 0.03 mg/100 ml). White: ring of four (or six). Cross-ruled: figures of eight. Hatched: chains of four.

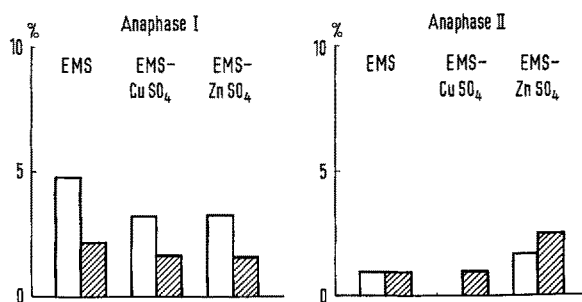


Fig. 2a and 2b. Percentages of aberrations observed at anaphases I and II (± 300 anaphases). White: bridges. Hatched: fragments.

The frequency of rings of four was higher without copper or zinc, but the proportion of figures of eight was higher with EMS-copper treatment (Figure 1). In this last case, the figures of eight were found to be more frequently asymmetrical although correctly coorientated at the equatorial plate.

This indicates that chromosome translocations should differ qualitatively from those appearing after the other treatments.

The different proportions of aberrations are not so evident for anaphases, these aberrations being in fact much less specific than in metaphase.

Comparing Figures 1 and 2a and b, it can also be seen that for all treatments, the number of aberrations decreases from metaphase I to anaphase II.

At anaphase I, the percentage of bridges (both chromatid and chromosome) is significantly higher than the percentage of fragments (Figure 2a), whereas this situation is almost reversed for anaphase II (Figure 2b).

The data presented here show that EMS treatments of barley seeds result in meiotic aberrations which will influence the mutation spectrum of the generation X2.

They also show that salts could also be used for changing the relative proportions of these chromosome aberrations⁷.

Résumé. Des semences sèches d'orge ont été traitées respectivement par des solutions d'EMS et d'EMS additionnées de sulfate de cuivre ou de sulfate de zinc. Nous avons montré qu'il en résulte des aberrations chromosomiques en méiose au cours de la génération traitée (X1). L'adjonction aux solutions de l'un ou de l'autre sel n'a pas accru la quantité de lésions observées, mais a fortement modifié la proportion des différents types d'aberrations chromosomiques.

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⁷ Work subsidized by the Centre National d'Etude des Mutations (Belgique).

Effect of α -Methyldopa and α -Methyl-m-tyrosine on the Mobilization of Free Fatty Acids

It has been well established that the sympathetic nervous system plays an important role in the mobilization of free fatty acids (FFA) from adipose tissue. The sympathetic transmitter substance norepinephrine has frequently been shown to mobilize FFA *in vivo* and *in vitro*¹, presumably by stimulating a lipolytic system in adipose tissue². Since adipose tissue contains considerable amounts of norepinephrine³⁻⁵ and enzymes connected with its synthesis and metabolism⁶, it is safe to assume that norepinephrine also serves as sympathetic transmitter in adipose tissue.

Recently we were able to demonstrate that the injection of tyramine and other aromatic monoamines which act through the release of norepinephrine from storage

sites in sympathetic nerve endings⁶ also produces mobilization of FFA from adipose tissue triglycerides, as indicated by the elevated plasma levels of FFA and glycerol⁷. This effect of tyramine was absent if the adipose tissue norepinephrine had previously been depleted by reserpine⁷.

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