



Medical Research Council

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Dr. F. H. C. Crick, FRS,
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California 92112, U.S.A.

Dear Francis,

I am sorry I have not yet acknowledged your letter of 4 October about Bak and Zeuthen. It was good of you to set out the problem in such detail. Your letter also explains why Zeuthen called off an arrangement I had made in July for me to collect some material for X-ray work on my way back from Uppsala two weeks ago. He told me, on the phone, that the material was not homogeneous enough to his satisfaction, but I had no idea until your letter arrived that the yields were so low. When Richard Skaer was repeating the experiments here, one could see a ^{small} number of metaphase chromosomes being unfolded which confirmed the phenomenon but I had, like you, naturally assumed that, by varying conditions, Bak and Zeuthen could get the majority of particles to do so.

Jim Paulson, from Uli Laemmli's lab. arrived a few weeks ago, and it seems that the view in Princeton is that the Bak and Zeuthen unit fibres are extended forms of the chromosome. The reason is that if they start off with a Wray and Stubblefield preparation in Pipes buffer, pH 6.5, together with calcium and hexyleneglycol, where the metaphase chromosomes look normal, they find that they can get elongated fibres, either by going to 2M urea or by removing the hexyleneglycol and adding EDTA. In both cases, they say they can see 300 Å fibres parallel to the long axis. They also can find different lengths of mitotic figures according to the amount of dextran sulphate used to remove the histones. When very little dextran sulphate is used, they see an elongated fibre with very few DNA loops but they only begin to see DNA loops clearly when the particles are shorter. I haven't digested all this yet but it is clear that they don't believe in supersolenoids but think of the unit fibre as a pulled out form of a chromosome rather than an unfolded one.

Be that as it may, I think we will first have to see whether the X-ray pictures give a 300 Å spacing at all! There has been some progress in this field since we now have much better X-ray cameras (thanks to Schutt and John Langmore) which can resolve these spacings in matters of hours. Thus, Langmore has been able to demonstrate a 300 Å spacing from chick erythrocyte nuclei, so at last we have the X-ray counterpart of Howard Davies' observations. (My sceptical colleagues, however, remind me that superbeads might be 300 Å in diameter, but I wonder whether a band at 300 Å would show up unless the superbeads were better ordered.)

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I am glad to hear that you are on the point of achieving your aim of losing a stone or so. Are you sure that you could then buy trousers off the peg to suit you? You seemed spare enough in July compared with even lean Americans. Anyway, congratulations on reducing your "hazard" status.

Yours ever,

Aaron

A. Klug