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19 April 1972

Dr. John D. Baldeschwieler
Deputy Director
Office of Science and Technology
Executive Office of the President
Washington, D.C. 20506

Dear John,

I enclose copies of two recently published papers that I think could be of great importance. The first is by W.T. Jackson, a very careful plant physiologist at Dartmouth. He finds that TCDD at a concentration of 10^{-4} ppm and possibly lower blocks mitosis in plant cells. The second paper by two persons at the University of Lund, with whom I am not familiar, reports blockage of oogenesis and chromosome disturbances by 2,4,5-T containing less than 0.1 ppm TCDD. If the observed effects actually are due to TCDD rather than 2,4,5-T, the results are not dissimilar from those of Jackson, since the TCDD concentration to which the Drosophila were exposed was presumably 10^{-5} - 10^{-4} ppm.

One possibility both Jackson and I have considered for the mechanism of action of TCDD is that it interacts sterically with microtubules, the structures found in all plant and animal mitotic spindles. Microtubules are essentially one-dimensional crystals composed of two different peptides, designated microtubulin α and microtubulin β . Microtubules are structural elements not only for chromosome movement but also for a wide variety of other intracellular mechanical purposes such as the extension of axones, sperm tails, and cilia. A single molecule of TCDD might conceivably be able to cause local disorder in the packing of tubulin, breaking or otherwise rendering the microtubule non-functional. If TCDD were able to do this, it could obviously be poisonous at very low concentrations and could affect a wide range of biological systems.

However, no matter what the mode of action of TCDD is, these two new papers together with the fact that we have no idea whether TCDD is or is not present in the environment at biologically significant concentrations greatly underscore the need for analysis of food and human tissue. As you know, Robert Baughman and I are working to develop a suitable analytical technique (but without support as yet from any granting agency). I am writing to ask you if you know of any lab, government or private, that is focussing specifically on this problem of environmental detection. If not, would it be a good idea to have a discussion of the problem at the OST by persons concerned with it in and out of government?

With best regards,

Sincerely yours,

Matthew Meselson

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