Do you consider any of these substances will cause death in those circumstances, even taken in small quantities? Would they have any effect on the liver?

The CHAIRMAN: May I just clarify for Mr. Brown? Mr. Roxburgh is referring specifically in this case to carbon tetrachloride, and while it does not refer specifically to pesticides and insecticides, he is asking whether these compounds, taken over a long period of time, may be producing diseases of a chronic nature.

Mr. ROXBURGH: Yes, that is it.

Mr. BROWN: We always look for experimental evidence to answer questions. This question of liver damage is a very interesting one. I take it that you might like to extrapolate from carbon tetrachloride to other chlorinated hydrocarbons such as D.D.T., which are used frequently. D.D.T. itself when fed to rats at moderately high levels has caused slight changes in a small proportion of the cells of the liver, changes which are reversible when the animal is removed from the D.D.T.

The fact that formulators on Tallahassee prisoners had such high residues in their body fat and yet were healthy has led a certain critic to say that therefore they must have had liver damage. This is a point which you cannot check on humans, but you can check it on animals which are closer to humans than rats, namely rhesus monkeys. It has been found when they have been fed very high levels of D.D.T., sufficient to attain 300 parts per million in their body fat, not only did they fail to show any symptoms whatever, but also when post mortems were conducted and their livers examined they showed no cell changes analogous to those which had been seen in rats. These findings were published this year.

Would that answer your question?

Mr. ROXBURGH: Yes, thank you.

The CHAIRMAN: Are there any questions, gentlemen?

Mr. WILLOUGHBY: It is certainly encouraging to hear such an optimistic report after some of the reports we have heard in this committee which almost made one feel it was dangerous to use all these things. However, I am glad to hear those reports are exaggerated to say the least.

You mentioned that in the use of D.D.T. the toxic substance was not in the D.D.T. itself but in the solvent. Is there any other solvent that could be less toxic?

Mr. BROWN: To obtain a concentration of D.D.T. you must use the aromatic oils. It might be possible to dissolve D.D.T. in nujol, which is the non-toxic oil, but it is scarcely soluble in it so you really could not obtain a formulation which would be of any use practically; and of course it would be tremendously expensive. Your excellent point, Mr. Willoughby, I cannot further answer.

The CHAIRMAN: Are there any other questions, gentlemen?

Professor Brown, perhaps you would care to go on with your statement on wildlife. There has been a great deal of talk in this committee on this subject.

Mr. BROWN: Mr. Chairman, the problem here has arisen because the cheapness and apparent safety of certain insecticides has now made it possible to tackle large-scale problems, particularly in forest protection, in order to combat destructive forest insects. Here we find that animals and organisms which cannot escape—nor indeed do they have any say in deciding whether there should be this operation—have become the target and their safety is at stake. A great deal of work was done on the toxicity of D.D.T. to wildlife between the years 1948 and 1950, and from that work it appeared that you could state that area sprays with D.D.T. were perfectly safe to mammals even up to doses of 5 pounds per acre of D.D.T., which is away above what is ever used.