30 August 1973

MEMO ON CHLORODIOXINS PRESENT IN FISH FROM SOUTH VIETNAM

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The possibility has been raised that TCDD present in fish from South Vietnam[1] might have come from chlorodioxin contaminants in pentachlorophenol used as a wood preservative by the local lumber industry. Although we so far have found no record of pentachlorophenol use in South Vietnam and although we know of no report of tetrachlorodioxins in commercial pentachlorophenol,[2,3] we carried out some experiments designed to test whether a connection exists between the TCDD observed and pentachlorophenol. Pentachlorophenol may contain various chlorinated dioxins, with the higher homologs predominating.[2,3,4] If the herbicide 2,4,5-T is the source of the TCDD, only the 2,3,7,8-isomer of TCDD should be present, and no hexachlorodioxin should be observed.

The results of our experiments are summarized in Tables 1 and 2. No hexachlorodioxin or 1,3,6,8-TCDD was found in the Vietnamese fish.

Considering that large areas of South Vietnam, including the watersheds of the sites where the fish were collected, were sprayed with 2,4,5-T thought to contain several parts per million of TCDD; that we find no record of pentachlorophenol use in South Vietnam or of the presence of TCDD in pentachlorophenol; and in light of the data presented in this memo, we feel it is virtually impossible that the TCDD found in Vietnamese fish samples originated from pentachlorophenol. The results are fully consistent with the origin of the TCDD being the herbicide 2,4,5-T.

REFERENCES

1. Baughman and Meselson, 1973. An Analytical Method for Detecti Dioxin. Analysis of Samples from Vietnam. Environmental Health Perspectives 1(5): (in press).

2. Firestone, Ress, Brown, Barron, and Damico, 1972. J. Assoc. Offic. Anal. Chem. 55:85.

3. Woolson, Thomas, and Ensor, 1972. J. Agr. Food Chem. 20:351.

4. Plimmer, Ruth, and Woolson, 1973. J. Agr. Food Chem. 21:90.

Table 1. Separation of 1,3,6,8-TCDD and 2,3,7,8-TCDD in various samples by preparative glc. Fractions were analysed by mass spectroscopy. Glc and MS conditions are described in reference 1.

Sample	Percentage of total TCDD observed	
	1.30 to 1.75 times m-terphenyl t_R	1.75 to 2.30 times m-terphenyl t_R
Neat 1,3,6,8-TCDD*	72%	28%
Neat 2,3,7,8-TCDD	<2.5%	>97.5%
Domestic U.S. fish + 500 ppt 1,3,6,8-TCDD	72%	28%
Domestic U.S. fish + 500 ppt 2,3,7,8-TCDD	<3.2%	>96.8%
Vietnamese fish (230 ppt total TCDD)	<3.8%	>96.2%
Domestic U.S. fish blank	N.D. (<3 ppt)	N.D. (<3.6 ppt)

* The presence of a TCDD signal in the fraction collected at the later retention time is probably due to tailing, not to the presence of 2,3,7,8-TCDD. (The 1,3,6,8-isomer is > 95% pure.)

Table 2. Levels of hexachlorodioxin. The cleanup procedure was the same as that for TCDD.[1] Analysis by mass spectroscopy was carried out at m/e 388 (387.837).

Sample	Hexachlorodioxin level
Domestic U.S. fish +1500 ppt hexachlorodioxin	860 ppt (57% recovery)
Domestic U.S. fish +1170 ppt hexachlorodioxin	880 ppt (75% recovery)
Domestic U.S. fish blank	$\leq$33 ppt
Vietnamese fish (750 ppt TCDD)	$\leq$ 21 ppt