

mal conversion is of the same order of magnitude as that from PCBs.

The problem of variability in analysis between different laboratories becomes particularly complicated when toxicity patterns are similar for two classes of chemicals, and this according to J. A. Moore (National Institute of Environmental Health Services, North Carolina) is the case for PCDFs and PCDDs. Looking at the effect of 2,3,7,8-tetrachloro, 2,3,7,8-tetrabromo and 2,3,4,7,8-pentachloro dibenzofuran in mice, guinea pigs and rhesus monkeys he noted species variations in the oral LD<sub>50</sub> values when the analogous halogenated dibenzodioxins were compared. Variations in the rates of metabolic degradation of halogenated aromatics were reported by H. B. Matthews (NIEHS) to depend on the degree and position of halogenation of the parent compound. Halogenated hydrocarbons are easily absorbed from the gut and lung. The more polar halogenated aromatics—phenols and phenoxyacetic acids—are excreted before metabolic degradation. The less polar PCDDs, however, are concentrated in the liver and excreted more slowly. Halogenated biphenyls—the least polar—accumulate in adipose tissue and skin and are generally metabolised before excretion. According to Matthews, as long as the 3,4 positions of the PCBs are available for enzyme attack the chemicals will have a fairly short half life.

R. A. Neal (Vanderbilt University School of Medicine, Nashville, Tennessee) observed that 2,3,7,8-tetrachlorodibenzo dioxin (TCDD) at a concentration of up to 1 mg per kg body weight did not prevent metamorphosis of tadpoles and neither did the dioxin interfere with the growth of human lymphocytes in culture. It has been reported that TCDD affects a hepatic cell line in culture, so Neal believes that it is just possible that the effect varies from cell to cell.

Both the PBBs induce hepatic and extrahepatic monooxygenases. Inducers of the hepatic enzymes have been classed in two groups with phenobarbital (Pb) and 3-methyl cholanthrene (3-MC) as the prototypes. According to J. Goldstein, (NIEHS) most PCB and PBB isomers belong to the Pb-type and induce cytochrome P-450; induction generally correlates with degree of halogenation and resistance to metabolism, but the position of the halogen is crucial in another respect. Isomers of these compounds with halogens in the meta and para positions but not in the ortho position (the PCDDs and PCDFs for example) are 3-MC types and induce a P450 subspecies, P448. This latter class is 25 times more toxic and potent than the Pb-type as in-

ducers. Toxicity symptoms also appear to correlate well with a chemical's potency as a 3-MC type inducer.

Poland *et al.* (*J. biol. Chem.* **251**, 4936; 1976) isolated a cytosolic binding protein for TCDD in mouse liver. Poland (University of Wisconsin) believes this to be a receptor for TCDD and consequently for other inducers. Toxicity symptoms also appear due to aryl hydrocarbon hydroxylase (AHH)—PCDDs are well known AHH inducers. He reported that the protein has a high affinity for TCDD, that binding is reversible, that the *in vitro* binding affinity of other PCDDs and PCDFs corresponds with their potency to induce AHH activity, that Pb-type compounds and steroids fail to bind and that the receptor binding site will accommodate planar molecules approximately 10 Å by 3 Å.

Concern about the carcinogenicity of the PCDDs has been voiced many times at Séveso. There are two convincing studies which now report that the 2,3,7,8-tetrachloro isomer is a potential carcinogen. R. J. Kociba (Dow Chemicals, Michigan) in a study previously referred to (*see Nature* **269**, 749; 1977) reported, however, that it is a weak carcinogen when given orally. A. M. Shefner (Illinois Institute of Technology Research Institute) reporting similar findings to Dow says that both TCDD and a mixture of isomers of hexachlorodibenzodioxin are weak carcinogens if administered orally but that when applied dermally they are complete carcinogens.

The clinical symptoms for assessing the extent of exposure to halogenated hydrocarbons is still a problem. Now, however, there seems to be some agreement that the skin disease chloracne is one of the most sensitive indicators of toxicity. This is the view of J. S. Taylor (Cleveland Clinic, Ohio) and S. A. Fischbein (Mount Sinai School of Medicine, N.Y.), and J. J. T. W. A. Strik (Agricultural University, Netherlands) believes that as halogenated hydrocarbons will induce porphyria in experimental animals, examinations of the urinary porphyrin pattern is also an important screening test for workers exposed to these chemicals.

Hexachlorophene, probably the best known bactericide, has been used in maternity clinics for many years. This use has been questioned in a report by Halling (*Swedish Med. J.* **74**, 542; 1977), who claimed that the bactericide was responsible for an increase in the malformation rate of children born in Swedish hospitals where hexachlorophene was used. In a report accompanying this paper the Swedish Health Services said they could not substantiate the Halling hypothesis,

that a larger study was in progress to check, it, but that they did find the high incidence of malformations in the Gothenberg area—one of those studied—considerably higher than would be expected. They could offer no explanation for this, however.

Halling (Södertälje Hospital, Sweden), in a paper presented on her behalf, has now reported results for a larger retrospective study involving 10 hospitals, 460 women exposed to hexachlorophene and 233 controls. In the hexachlorophene group 25 severe malformations were observed in 460 neonates; in the 233 controls no severe malformations were seen. Minor malformations were also higher in the hexachlorophene group. The Halling study—which reports a wide range in the type of abnormalities seen—is, as yet, unconfirmed. One hopes that other investigators will act swiftly to confirm or refute it. □

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## A hundred years ago

THE MODE OF RECOGNITION AMONG ANTS.—The combats and communications of ants are among the most interesting and mysterious phenomena. The Rev. H. C. McCook has given an account to the Academy of Natural Sciences at Philadelphia of some experiments he has made to determine what is the mode of recognition among ants. He has studied the pavement ants (*Tetramorium caspium*), which he has observed engaged in continued combat for over a fortnight, the warriors being only the workers or neuters. There is no distinguishable difference between the ants of the fighting parties, yet they recognise each other infallibly as friend or foe. They challenge all comers with their antennæ; if they are friends, they pass on; if foes, they straightway interlock and "fall to." Mr. McCook surmised that recognition was based upon a certain odour emitted by the respective factions. He found that if they were enveloped in an odour of eau-de-Cologne, while not at all deprived of activity, all became harmonious; those who were previously engaged in battle unclasped one another, and they went on for several days amicably feeding, burrowing, and building.

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