PCB ELIMINATES HORMONES

A much used compound spreads -- together with DDT the polychlorinated biphenyls should also be prohibited

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In the German Federal Republic some decisions are being prepared which aim at the prohibition of the use of DDT in agriculture and home, starting with May 1971. These measures are however, inconsistent, half measures.

Since several years already, is spreading in growing amounts the use in the environment of a group of compounds whose biological properties are nearly identical to those of DDT, and which the legislator should also prohibit. These are the PCB compounds (shortened for "polychlorinated biphenyls").

These compounds containing a chlorine content between 30 to 60 percent, are used exclusively in industry. Particularly three industries employ PCB: for electrical manufacturing they serve as non-combustible lubricating, insulation- and cooling materials for ex. in the construction of transformers; the dye industry uses them as additives to dyes, lacquers and varnishes, and the plastic plants use them as alkali- and acid resistant plasticizers. With a plasticizer the plastics reach a desirable degree of elasticity.

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In refuse burning the non-combustible PCB are vaporized. In 1966 they were detected in the air over Hamburg and London. They are carried however away by the Rhine river and can be found in mussels, fish and sea-birds in water regions of the Netherland coasts. Then just as DDT, PCB is soluble in fats and accumulates from the nutritional chain of algae in the fatty tissues of small crayfish, fish and birds.

PCB's are chemically even more stable than DDT; they are more difficult to decompose in nature by micro-organisms and other agents. Also in passing through an organism they are not decomposed chemically, but are stored in the fat and can in dieting cures show effects similar to the ones known for DDT.

DDT and PCB excite the liver into producing enzymes, which for ex. can rapidly decompose the acid barbituric sleeping agents, so that the effect of dosages of such medicinals is becoming less and less predictable, in practice. In a similar manner the sex-hormones such as progesterone, testosterone and oestradiol are eliminated from the body. The liver enzymes convert all these compounds into easily water-soluble decomposition products, which are eliminated from the blood by the kidneys. This effect was proven for chlorinated hydrocarbons, to which belongs DDT and also for PCB.

Shortly it became suspicious that DDT is the reason when a woman despite conscientious taking of birth control pills gave birth to healthy twins, which frequently occurred. It could, if the chain of causes is confirmed be PCB, since they are present in higher percentages in the human fatty tissues.

In the Food Institute of the University of Munster, Ludwig Acker and Frhard Schulte studied since several years the milk of women and samples of human fat. These investigators were able for the first time to find in such studies PCB and the seed disinfectant HCB (Hexachlorobenzene).

Their analyses gave the following average values: 3.3mg DDT and DDE (a decomposition product of DDT), 5.7mg of PCB and 6.3mg of HCB per Kg of fatty tissues. For the milk fat of the woman's milk the average values are similar: 3.8mg of DDT and DDE, 3.5mg of PCB and 5.3mg HCB per kilogram of milk fat.

With the restricted ban on DDT - the foreatry industry would still consume the remaining industrial amounts - this chlorinated hydrocarbon is not going to disappear immediately. It is estimated that the DDT molecule has an "average life" of ten years. It is decomposed, but very slowly. Among the decomposition products are the so-called "metabolites" of DDT - DDE and DDD. These metabolites of DDT have very often concealed the presence of PCB because of the difficulty of analysis.

Only in 1966 was Soren Jensen from the Stockholm University Institute of Analytical Chemistry able to detect PCB in the Swedish environment. He found it in 200 samples, mostly in fish and fish spawns from the rivers and Swedish coasts. He also found it in a dead eagle, in the feathers of the bird,in its skin hair, in his wife and in his five-month old daughter. The daughter, assumed the investigator, picked up her dose of PCB from her mother's milk.

In the Stockholm National Natural History Museum where eagle - shells are preserved back to 1880, Jensen tested for PCB content and discovered the compound for the first time in the feathers of an eagle killed in 1944. This time in Sweden, PCB was used as hydraulic "oil" and insulation.

In the summer of 1969 Soren Jensen had together with a team of biologists again collected and analyzed samples from Swedish coastal waters and the North Sea. A considerable increase in PCB and DDT residuals was found. PCB was found in Perch, Herring, Flounder, spiney urchins (commercially known as eels) in mussels, in robins, sea-eagles, grey seagulls. The concentrations were in some cases ten to hundred times higher than in identical ocean-animals of the English coasts.

From the ten sea-eagle couples in the flocks of Stockholm only two young birds were raised in the last years. Jensen studied some birds and found three toxic compounds: DDT, PCB and mercury. Only DDT or PCB can be responsible for this fall of breeding. Both compounds together have a damaging effect on calcium metabolism of the bird.

The establishment of calcium reserves in the joints of female birds at the beginning of the breeding cycle is enhanced by the oestrogen hormone. In DDT- and PCB-contaminated birds the reserves of calcium are smaller, because these environmental poisons lower the level of oestrogen. The birds lay then eggs with thin shells, not suitable for breeding.

Despite the many hazardous properties of DDT there isn't until now any specific"pesticide-syndrome in man. This can also be said of PCB, but "they are toxic" wrote Acker and Schulte. Until now various laboratories made known some toxic and teratogenic effects. The Dutch Koeman from the Institute of Veterinary Pharmacology and Toxicology of the University of Utrecht who found again PCB contamination of the Rhine river in the ocean animals of the coasts, mentions that PCB causes in small quails and hens of the white leghorn species accumulation of water in the heart sack.

Koeman writes: "The particular physical properties and the chemical stability of PCB make it probable, that its use will grow and its distribution in the environment will increase".

The PCB content of the human fat tissues will therefore also increase. It already exceeds in many citizens the content of DDT.

Further, since the Food Institutes are not in a position, because of lack of equipment, personnel and routine measurements, to prove PCB in food products and body tissues, the situation is not very encouraging.

Translated by Paula Rayman
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