J. Agr. Food Chem. 19(1): 204-6; 1971. (13 references)

Simultaneous application of *p*-chlorophenyl methylcarbamate (PCMC) with 3',4'-dichloropropionanilide (propanil) to soil retards propanil degradation in soil and greatly reduces the formation of 3,3',4,4'-tetrachloroazobenzene (TCAB). An explanation for this phenomenon was found in enzymatic studies, conducted with a partially purified enzyme isolated from a propanil hydrolyzing soil fungus. Enzymatic hydrolysis of propanil to propionic acid and 3,4-dichloroaniline (DCA) was strongly inhibited by PCMC and 1-naphthyl methylcarbamate (carbaryl), but only weakly inhibited by 2,3-dihydro-2,2-dimethyl-7-benzofuranyl methylcarbamate (carbofuran). PCMC did not affect the conversion of DCA to TCAB in soil. (Author abstract by permission of the American Chemical Society)

71-0671. Davey, R. J.; Gerrits, R. J. (Animal Res. Div., Agricultural Res. Ser., Dept. of Agriculture, Beltsville, Md. 20705). **Lindane residues in tissues and excreta of swine.** *J. Animal Sci. 31(3): 491-3; 1970.* (6 references)

The effects of lindane as measured by residues in tissues and excreta of swine were determined. Duroc and Yorkshire boars weighing about 70 kg each were divided into groups of four and sprayed twice with a 0.05% lindane solution (ten times greater than the normal level used for ectoparasite control), fed 1 or 2 mg of lindane/kg/day for 3 weeks, or left untreated. Test animals were maintained on a standard 14% protein corn-soybean meal diet. During the final week of the experiment, the pigs were kept in metabolism cages for the collection of urine and feces. Pigs that were on the spray treatment were sprayed once at the beginning of the experiment and again the day before being transferred to the metabolism cages. Test animals gained an average of 10 lb during the test period. The pigs were sacrificed and the liver, kidney, backfat and longissimus dorsi muscle were removed and stored at -20 C. The method used for the residue determinations is described in the HEW publication, "The analysis of pesticide residues," Vol. 1, 1965. The levels of lindane found in the backfat of pigs that were sprayed, fed lindane at rates of 1 and 2 mg/kg/day or left untreated were 5.15, 19.50, 44.25 and 0.19 ppm, respectively. The correspondinglevels in the longissimus dorsi for the same groups were 0.57, 2.37, 6.55 and 0.05 ppm, respectively. Lindane concentrations in the urine and feces for all groups were generally less than 0.01 and 0.25 ppm, respectively. Fecal levels did not appear to be associated with treatment. The data indicated that lindane residues in excess of the present tolerance of 4 ppm can accumulate in the edible tissues of swine. Little residue accumulation occurs in edible tissues in those cases where pigs are sprayed with a 0.05% lindane solution no later than 30 days prior to slaughter.

71-0672. Korschgen, L. J. (Missouri Dept. of Conservation, Columbia, Mo. 65201). **Soil-food-chain-pesticide wildlife relationships in aldrin-treated fields.** *J. Wildlife Management 34(1): 186-99; 1970.* (39 references)

The results of a study of the concentration of aldrin-related residues in cropland soils and wildlife foods as a result of annual applications of aldrin for pest-control are reported. The test sites were two aldrin-treated cornfields separated by a 10-acre buffer strip in Saline County, Missouri. The fields were treated for 16 and 15 of the past 17 years with aldrin at 1 lb/acre. Samples were taken of soil, earthworms, crickets, two species of ground beetles at 24 sites from eight collecting stations in each field. As available, vertebrates and plant seeds were also gathered. Primarily, the residues consisted of dieldrin, the breakdown product of aldrin. Organochlorine analyses were done by gas and thin-layer chromatography. In soil samples taken in 1965 to 1967, aldrin and dieldrin were found in all samplings in a ratio of 1:4. Annual application of 1 lb/acre of aldrin was equivalent to 0.05 ppm evenly distributed in the top 6-in soil zone. Test field soils had a 3-year average amount of about 0.12 lb aldrin and 0.5 lb dieldrin/acre after 15 and 16 years of aldrin a ½ lb/acre. Combined aldrin-dieldrin residues were 0.31 ppm, or less than 1 year's application. There existed an annual carry-over but no sign of continuing accumulation. Although there was no record of DDT use, DDE and DDD were detected in small amounts. In earthworms combined residues of aldrin-dieldrin averaged 1.49 ppm; dieldrin formed 95.5% of the residue, with aldrin being 4.5%. Breeding populations of insects in the test fields argued for the survival of resistant adults. The pesticide burden was small in crickets, being generally less than in the soils; the 3-year average of aldrin-dieldrin combined was 0.23 ppm. In *Harpalus* and *Poecilus* spp. ground beetles, the combined 3-year average aldrin-dieldrin residue was 1.10 and 9.33 ppm, respectively. Pesticide burdens were most likely a reflection of feeding habits. Beetles because of predation have greater opportunity to accumulate residues via the food-chain than do crickets or mice. Young-of-the year toads (*Bufo americanus*) yielded an average combined aldrin and dieldrin residue of 4.6 ppm. Garter snakes showed 12.5 ppm as an average dieldrin-aldrin residue. Plant seeds (corn, sunflower and foxtail) showed residues at less than 0.02 ppm each. During the summer of 1967, earthworms, toads, and mice stored peak aldrin-dieldrin body burdens of 5.65, 8.3 and 2.52 ppm, respectively. This resulted in 10.3 to 14.4 ppm residues in garter snakes which fed upon these animals. The implications of pesticide-wildlife relationships are discussed.

71-0673. Holden, A. V. (Freshwater Fisheries Lab., Pitlochry, Scotland). **Source of polychlorinated biphenyl contamination in the marine environment.** *Nature 228(5277): 1220-1; 1970.* (9 references)

Samples of river water (surface and subsurface) and of sewage sludge were analyzed by gas-liquid chromatography to ascertain the source of PCB (polychlorinated biphenyls) residues in the Firth of Clyde. Aroclor 1254 and Aroclor 1260 (54 and 60% chlorine, respectively) were used as references. No PCB residues could be found in the river samples (detection limit 0.01 ppb) and samples of effluents discharged from trunk sewers into the river showed no significant concentrations of PCB. Samples of zooplankton and clupeoid fish in the region contained 0.03 and 2.6 ppm PCB, respectively. The GLC peak pattern for sludge A was closely similar to that of Aroclor 1254, suggesting that the PCB detected contained about 50% chlorine. Sludge B peak pattern was

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similar to Aroclor 1260, indicating a 60% chlorine concentration in the PCB residue. Extracts of the sludge from the various industrial plants consistently yielded concentrations of 50 to 160 ppm PCB (dry weight). On the basis of these results and the amount of sludge transported to the deep waters and dumped, it was calculated that about 1 ton of PCB was dumped each year. Similar analyses from Manchester and London revealed that these cities also dumped about 1 ton PCB each into the Northern Irish Sea and off the Thames estuary, respectively. The source of the PCB residues could be traced no further than the sewage treatment plants within the scope of this study. It is believed that the residues originate in industrial wastes. No PCB residues have so far been detected in freshwater fish in Scotland.

71-0674. Stewart, D. K. R.; Chisholm, D.; Ragab, M. T. H. (Res. Station, Canada Dept. of Agriculture, Kentville, Nova Scotia, Canada). Long term persistence of parathion in soil. *Nature 229(5279): 47; 1971.* (7 references)

Soil samples from plots which had been treated with 31.4 lb/acre parathion yearly from 1949 through 1953 were analyzed using a gas-liquid chromatograph (GLC) equipped with a flame photometric detector in order to identify the possible degradation products. Earlier studies (Chisholm) *et al.*, 1955) of soil from these plots found that the parathion residues had declined from the applied concentration of 15.7 ppm to 0.5 ppm in the fall of 1953. By 1964, the residue concentrations were further reduced to 0.2 ppm. This detection method (Averell and Norris, 1948) did not allow identification of degradation products. New samples were taken from depths of 0 to 4, 4 to 8, 8 to 12 and 12 to 16 in, air-dried, extracted with hexane/acetone (1:1) and prepared for analysis by GLC using the flame photometric detector. The samples were analyzed using three different columns: a 3% OV-17, 2% DEGS and a 10% DC-200 column. Small quantities of parathion were detected and identified, but no degradation products were found. These findings were confirmed by thin-layer chromatography (TLC) using an esterase inhibition technique (Mendoza *et al.*, 1968). Residue concentrations detected at the various depths were 0.060, 0.063, 0.008 ppm and only a trace at 0 to 4, 4 to 8, 8 to 12 and 12 to 16 in, respectively, which showed there was very little downward movement of parathion in this sandy loam soil. A total of about 0.1% of the parathion applied to the plots remained in the soil 16 years after the last application. That parathion may have been dissolved in lipids of the soil organic matter and thus protected from bacterial degradation and hydrolysis may explain its unusually long persistence in the soil.

71-0675. Lloyd-Jones, C. P. (Long Ashton Res. Station, U. of Bristol, Bristol, England). Evaporation of DDT. *Nature 229(5279): 65-6; 1971.* (8 references)

The evaporation rate of uniformly ring-labeled ^{14}C DDT was investigated and compared to the calculated rates. Calculating the rate from the relation between the vapor pressure, the gaseous diffusion coefficient and the still air layer thickness, DDT should evaporate at the rate of 0.003 mcg/sq cm/hr at 20 C and at 0.0002 mcg/sq cm/hr at 5 C. Another method of calculating the rate using the relation between the rate of loss, the product of vapor pressure and the square root of the molecular weight results in a rate of 0.002 mcg/sq cm/hr. The labeled DDT (0.5 mcg/sq cm) was applied in ethanol to 3.8-sq cm aluminum planchets. During 53 days in a well-ventilated room away from direct sunlight, radioassays revealed that the counts steadily decreased from the initial value of about 180 to 10 cps. When maintained outdoors in a Stevenson's screen for 43 days when the average maximum and minimum temperatures were 7.0 and 1.3 C, the count declined from 200 to 80 cps. The mean rates of loss in these two experiments were 0.002 mcg/sq cm/hr and 0.0003 mcg/sq cm/hr, respectively. The same amount of DDT was placed in enamelled metal dishes and exposed continuously to blowing air (about 10 mph) for 14 days. Recoveries were between 29 and 33% of the control, equivalent to 0.001 mcg/sq cm hr. A fourth experiment designed to recover the volatilized radioactivity, revealed that inverted untreated planchets acquired radioactivity with a mean count of 20 cps after 14 days at 20 C. The experimentally determined evaporation rates, in good agreement with the calculated values, are equal to about 2 lb/acre/yr in the summer and about 0.3 lb/acre/yr in the winter. About ½ of the DDT applied to field crops may enter the atmosphere.

71-0676. Acker, L.; Schulte, E. (Institut fuer Lebensmittelchemie, Universitaet Muenster, Muenster, Germany). The occurrence of chlorinated biphenyls and hexachlorobenzene in addition to chlorinated insecticides in human milk and fat. *Naturwissenschaften 57(10): 497; 1970.* (5 references) (German)

This is a report for the first time of the finding, by gas-chromatographic techniques, in human milk and fatty tissue extracts of significant amounts of polychlorinated biphenyls (PCB), hexachlorobenzene (HCB), DDT, DDE and *beta*-HCH (*beta*-hexachlorocyclohexane). In whole human milk, the content of PCB and HCB was 0.103 and 0.153 ppm, respectively; in human milk fat 3.5 and 5.3 ppm, respectively, and in human fat tissue 5.7 and 6.3 ppm, respectively. The possible origin of these residues in the light of the uses of PCB in electrotechnology, laquers, varnishes, plastics and synthetics products is discussed.

71-0677. Edwards, C. A.; Thompson, A. R.; Beynon, K. I.; Edwards, M. J. (Rothamsted Experimental Station, Harpenden, Hertfordshire, England). Movement of dieldrin through soils. I. From arable soils into ponds. *Pesticide Sci. 1(5): 169-73; 1970.* (11 references)

Dieldrin was applied at a rate of 22 to 45 kg/ha to strips above four ponds. Samples of soil from the strips, soil from the slopes leading to the ponds, pond water and pond-bottom mud were removed at intervals up to 81 weeks and extracted with hexane. The extracts were analyzed by gas-liquid chromatography (GLC) to trace the movement of dieldrin from the treated strips into the ponds. Recovery values ranged from 75 to 100%. At Kineton (England) sites A and B, the dieldrin was lightly raked into the soil surface, at the Solihull site it was thoroughly incorporated into the soil and at East Meon it was

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71-0784. Davison, K. L. (Metabolism and Radiation Res. Lab., Animal Husbandry Res. Div., Agricultural Res. Ser., U.S. Dept. of Agriculture, Fargo, N. D. 58102). Growth, hemoglobin, body composition and vitamin A of sheep fed dieldrin. *J. Animal Sci. 31(3): 567-75, 1970.* (11 references)

The effects of prolonged feeding of dieldrin on growth, body composition, plasma and liver vitamin A and hemoglobin in sheep is reported. Dieldrin was dissolved in acetone solution and mixed with a diet supplement containing oats, barley, corn, soybean meal, mineralized salt and dicalcium phosphate. Four-hundred g of pelleted alfalfa hay and 100 g of the dieldrin-treated supplement were fed twice daily to 135 crossbred wethers weighing 30 to 40 kg. Two replicates were run using 60 to 75 sheep, respectively. Dieldrin concentrations of 0, 1, 2 and 4 mg/kg were used in the first replicate but ten of 12 sheep dosed with 4 mg/kg died within a month. A second replicate was carried out using dieldrin concentrations of 0, 0.5, 1 and 2 mg/kg. Two sheep from each treatment were slaughetered at 0, 4, 8, 16 and 32 weeks. Tissue samples and gastrointestinal contents were removed when the animals were slaughtered. The carcass remains and intestines from the second replicate were ground, blended in a Waring Blender and freeze-dried with a Virtis freeze-drier. An adiabatic Parr oxygen bomb calorimeter was used to determine the heats of combustion of feed and carcass samples. The Kjeldahl method was used for the determination of nitrogen which was converted into protein values by multiplying by 6.25. Hemoglobin in the jugular blood was analyzed monthly using the cyanmethemoglobin method (Evelyn and Malloy, 1938). The microcapillary method and the Kimble (1933) method were used to analyze hematocrit and vitamin A, respectively. The method of Davies (1933) was used to analyze vitamin A in the liver tissue samples at slaughter. Plasma vitamin A was determined monthly while liver vitamin A and the carcass fat and protein content were determined when the animals were killed. Growth, body fat and plasma vitamin A were not affected by dieldrin concentrations lower than 2 mg/kg but at the 2-mg/kg level, the action of dieldrin reduced the rate of gain and accumulation of body fat and also reduced the vitamin A levels in the plasma. Dieldrin did not affect hemoglobin, hematocrit and liver vitamin A.

71-0785. Ratcliffe, D. A. (The Nature Conservancy, Monks Woods Experimental Station, Abbots Ripton, Huntingdon, England). Changes attributable to pesticides in egg breakage frequency and eggshell thickness in some British birds. *J. Appl. Ecol. 7(1): 67-115; 1970.* (86 references)

This paper is a general review of the subject, dealing with the following topics: the recent frequency of egg breakage, the nature of egg breakage, parental destruction as the proximate cause of egg breakage, other possible causes of egg breakage, decrease in eggshell weight (peregrine, sparrowhawk, golden eagle and other species), the causes of the eggshell effect, the connection with environmental pollution, the decrease in eggshell weight, egg breaking, breeding failure and population change and the significance of egg breaking in a 'natural' situation. Egg breakage in the nests of British peregrines (P), sparrowhawks (S) and golden eagles (G) has increased with unprecedented frequency. Most breakage is attributed to parent birds, usually by the eating of both shell and contents. A proximate cause seems to have been a wide and substantial decline in weight (largely thickness) of the shell. For P and S, the change began in 1946-1947, climaxing in 1948-1950 and persisting to the present. For G, the beginning was probably no later than 1951. Other species have shown the phenomenon: kestrel (from 1946), merlin (from 1951), hobby (from 1952), shag (from 1951), rook (from 1958) and carrion crow (from 1958). No significant change has been found in eggshells of common buzzard, raven, guillemot, razorbill, kittiwake, blackheaded gull, golden plover or greenshank. One known environmental change parallels in time and geographical pattern the eggshell change and has a likely connection physiologically: the contamination (after 1945) of the ecosystem by synthetic organic chemicals used as pesticides and in industry. Organochlorine substances build up notably in tissues of wild raptors. Experiments have shown that organochlorines alter calcium metabolism in birds. The introduction of DDT and *gamma*-BHC (1946-1948) was contemporaneous with the onset of eggshell change. Dieldrin-type compounds since 1955 added to organochlorine contamination probably have enhanced the eggshell change. PCBs (polychlorinated biphenyls) may have contributed. In Great Britain, there is a correlation between geographical variation in level of contamination, degree of change in eggshell weight and egg breakage frequency for P, S and G. Organochlorines set off a chain of events in some raptors: decrease in shell thickness leading to more frequent egg damage and to more frequent parental destruction of damaged eggs. There may have been harmful effects on breeding behavior and thus a decline in breeding success which may have helped prevent recovery from population "crashes" from adult mortality of P and S after 1955. Interspecific differences in eggshell change may derive from differences in degree of exposure to residues, differences in uptake and biochemical reaction to a particular residue level. Parental egg-breaking may be a response to adverse conditions manifested between ovulation and hatching. Eggshell change due to chemical contamination serves as an adverse factor in place of a 'natural' adverse factor, but the outcome is more detrimental to the species if reduced breeding success is maintained.

71-0786. Fowler, J. S. L. (Dept. of Veterinary Pharmacology, Royal (Dick) School of Veterinary Studies, U. of Edinburgh, Edinburgh, Scotland). Chlorinated hydrocarbon toxicity in the fowl and the duck. *J. Comp. Pathol. 80(3): 465-71, 1970.* (17 references)

The effects of carbon tetrachloride (CCl4) and hexachloroethane (HCE) on aspartate amino transferase (GOT), iditol dehydrogenase (SD), glutamate dehydrogenase (GD) and ornithine carbamyl transferase (OCT) activity and bromsulfthalein (BSP) clearance in various tissue extracts were studied in cockerels and ducks. The cockerels were the White Leghorn breed, 1.4 to 1.6 kg in weight; the ducks were the Khaki Campbell breed, 1.6 to 1.9 kg in weight. CCl4 was given to both cockerels and ducks in doses of 6 ml; cockerels received HCE in doses of 4 g in olive oil; in both cases, the route was oral. Olive oil was the control substance. CCl4 had no adverse effect on ducks but produced light narcosis, anorexia and

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into two 0.5 ml microcuvettes, bubbling one of them with CO and determining the difference spectrum on a recording spectrophotometer. The ethyl isocyanide difference spectrum was measured similarly. The cytochrome b5 difference spectrum was obtained similarly using 1 mcM NADH or NADPH to produce the difference. The protein level was twofold greater in the females. The females also had higher cytochrome P-450 levels on a per-fly basis, but males had higher P-450 content on a microsomal protein basis. The substrate specificity ratio showed a marked specificity of the Fe and R-Baygon resistant microsomes for DDT and PNA (*p*-nitroanisole) metabolism, respectively. The cytochrome b5 content did not differ with sex or strain on a per-fly basis, but on a microsomal protein basis, the males had the higher content. The b5 level was increased slightly in both sexes of the Orlando DDT-resistant strain and cytochrome P-450 was increased more in the females than the males by nontoxic doses of dieldrin. Piperonyl butoxide applied to the thorax resulted in increased b5 level when NADPH was used for reduction and a decrease in P-450 determined with ethyl isocyanide. Piperonyl butoxide added to the microsomal suspensions gave the same results. The results indicated that the cytochrome b5 increase is neither sex- nor strain-dependent, while the difference in cytochrome P-450 is both sex-and strain-dependent.

71-0802. Sutherland, D. J.; Sierwierski, M.; Marei, A. H.; Helrich, H. (Dept. of Entomology and Economic Zoology, Rutgers The State U., New Brunswick, N. J. 08903). **The effect on mosquitoes of sublethal exposure to insecticides. II. DDT metabolism.** *Mosquito News 30[1]: 8-11; 1970.* (14 references)

The uptake and metabolism of DDT in mosquito larvae (*Aedes aegypti*) exposed to the insecticide were investigated. Approximately 800 mosquito larvae that had hatched about 1 hr earlier were placed in enameled pans containing water treated with 0.001 ppm DDT (in ethanol). About 0.8 g of ground Purina Laboratory Food was added to the water daily. The pans were covered loosely with aluminum foil and maintained at 30.5 C. On days 3 and 5, respectively, total larval and pupal populations of individual pans were counted, recovered by filtration, rinsed with fresh water and homogenized in 5 to 10 ml of acetone. Adult populations from each pan were trapped, counted and homogenized in acetone. Homogenates were filtered through a sintered glass funnel. The acetone-water solutions remaining after the acetone washings were extracted with hexane, concentrated and passed through Florisil. The sample was eluted with ethyl ether in hexane and then concentrated before being injected into a Micro Tek MT 200 gas chromatograph equipped with a Ni-63 electron-capture detector. The methods used for the analyses were those of Siewierski and Helrich (1967). Recovery values for DDE, DDD and DDT were 90.1, 84.8 and 81.7%, respectively. DDT was adsorbed during the early larval stages. The findings showed that DDT was metabolized slowly during the pupal and early adult stages, while DDD was rapidly metabolized by the mosquito and/or microorganisms. The amounts of DDD found in the adult mosquito were negligible. The findings suggest that immature mosquitoes containing sublethal quantities of DDT which emerge as adults may serve as an efficient dispersal agent of this insecticide and its metabolites from aqueous to terrestrial environments.

71-0803. Godfraind, J. M.; Krnjevic, K.; Pumain, R. (Dept. of Res. in Anaesthesia, McGill U., Montreal, Quebec, Canada). **Unexpected features of the action of dinitrophenol on cortical neurones.** *Nature 228[5271]: 562-4; 1970.* (28 references)

The effect of 2,4-dinitrophenol (DNP) on cortical neurons of cats was investigated. Test animals were anesthetized with a mixture of nitrous oxide and methoxyflurane. Succinylcholine was infused i.v. to reduce pulsation of the brain. The techniques described earlier by Krnjevic and Schwartz (1967) and Dreifuss *et al.* (1969) were used to record the membrane potential and resistance as well as extracellular microiontophoresis. The release of DNP from a 0.1 M sodium salt solution was effected at pH 9 by an inward current (microelectrode relatively negative). Immediate estimates of the membrane resistance and the reversal levels of inhibitory synaptic potentials (IPSPs) were obtained in some experiments in which a Line 8 computer was used on-line to apply pulses, sample membrane potentials and derive voltage-current lines (Kelly, 1969). Electrical excitability was markedly decreased by the action of DNP. This decrease was associated with a tendency to hyperpolarization and a lower resistance of the membrane. The possible explanations for these observations are discussed. Intracellular recordings showing the effect of DNP and acetylcholine in the pyramidal neuron and recordings showing IPSPs in the neuron by surface shocks (0.1 ms, 12 V, at 3 Hz) are illustrated and detailed.

71-0804. Lincer, J. L.; Peakall, D. B. (Langmuir Lab., Sect of Ecology and Systematics, Cornell U., Ithaca, N. Y. 14850). **Metabolic effects of polychlorinated [illegible] in the American kestrel.** *[illegible] 228[5271]: 703-4; 1970.* (14 references)

The metabolic effects of Aroclor 1254 (54% chlorine) and Aroclor 1262 (62% chlorine) in the American kestrel were investigated. American kestrels were trapped and acclimatized for 1 week. Male and female birds were paired, acclimatized for another week and then transferred one pair/cage to burlap-covered wire cages and fed once a day for 5 months with 1-day-old dead cockerels that had been injected in the breast region with 0.5 or 5.0 ppm Aroclor 1254 or 1262 in sesame oil. Kestrels which were fed on cockerels injected with sesame oil only served as controls. Kestrels were sacrificed at the end of the experiment and their livers were excised. The microsomal fraction was prepared and incubated as detailed by Conney and Klutch (1963). Radioactive estradiol and its metabolites were extracted with dichloromethane and separated by paper chromatography (Kuntzman *et al.*, 1966) as modified by Peakall and Risebrough *et al.* (1967 and 1968). Histological examinations were carried out on the livers of kestrels which were fed a diet containing 5 ppm Aroclor 1254 for 14 days. Tissue sections were fixed in Carnoy's fluid and treated with deoxyribonuclease to remove DNA which could interfere with the azure B stain. Sections were then stained in

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azure B, washed with water and differentiated overnight with *t*-butyl alcohol (Flax *et al.*, 1952). Staining density with azure B was measured cytophotometrically at 545 nm. The mean values obtained for the percent transmission of a standard area of cytoplasm in liver were approximately 39.7 for the control birds and 26.8 for the treated birds. The decrease in percentage transmission was believed to have resulted from the presence of larger amounts of cytoplasmic RNA in the kestrels treated with Aroclor. A dose-dependent *in vitro* microsomal breakdown of estradiol to a more polar metabolite was observed in livers from kestrels dosed with either Aroclor tested. The effects of the two compounds were similar and were no different in male than they were in female birds. The conversions noted in Aroclor-dosed birds did not occur in untreated birds. Increased hepatic enzyme activity was found to be related to the increase in cytoplasmic RNA. The experimental findings suggest that the physiological actions of the tested PCBs were much like those of DDT and its metabolites and like the organochlorines, these industrial contaminants should be considered as a burden to the ecosystem.

71-0805. Fahim, M. S.; Bennett, R.; Hall, D. G. (Dept. of Obstetrics and Gynecology, U. of Missouri School of Medicine, Columbia, Mo. 65201). **Effect of DDT on the nursing neonate.** *Nature 228(5277): 1222-3; 1970.* (10 references)

Forty parturient Holtzman rats were injected i.p. with 0, 1, 5 or 25 mg of technical grade DDT/kg body weight 24 hr after delivery and daily for 21 days to determine the effect of DDT on the nursing neonate. After evaluation of growth and mortality rates, the animals were killed and calcium, potassium, magnesium, manganese, copper, iron and zinc in neonatal livers were determined by atomic absorption spectrophotometry. Growth rates of neonates of DDT-treated mothers were depressed proportionally to the amount of maternally administered drug. The mortality rates were 13, 32 and 100% of the neonates from mothers receiving doses of 1, 5 and 25 mg/kg/day, respectively. Hepatic assay revealed a significant increase in copper and a coincidental decrease in calcium. Recent studies have shown that DDT influences calcium metabolism in several avian species, stimulates hepatic microsomal activity in animals and humans, enhances metabolism of some drugs and increases urinary excretion of *6beta*-hydroxycortisol. It is also indicated that the induction of avian hepatic enzyme activity by chlorinated hydrocarbons increases the metabolism of sex hormones both *in vitro* and *in vivo*. The structure of vitamin D is sufficiently similar to that of the sex hormone investigated to suggest that vitamin D metabolism might be accelerated by chlorinated hydrocarbons, thus affecting the absorption of calcium from the gastrointestinal tract. When compared on the basis of concentration and calculated as a fraction of the daily intake, cows excrete less DDT in lactational fluids than human females. This suggests that ill-effects may result from the exposure of human neonates to DDT through the mother's milk. This problem may be particularly significant in developing countries where the economy is largely agricultural and most children are breast-fed for 1 or more years. Further research concerning the dose-related effects of DDT on mineral metabolism in animal and human neonates is in progress.

71-0806. Findlay, G. M.; deFreitas, A. S. W. (Div. of Biology, National Res. Council of Canada, Ottawa 7, Canada). **DDT movement from adipocyte to muscle cell during lipid utilization.** *Nature 229(5279): 63-5; 1971.* (16 references)

Tissue samples from pigeons that had ingested 0, 3.101, 32.07 or 335.0 mg 14-C-DDT/bird and then were starved, were analyzed to determine the mobilization rate and the fate of the DDT quantitatively. After dosing, the birds were allowed to feed *ad libitum* for 3 days. At this time, six birds from each group were killed to determine the total body burden of DDT and its metabolites. The remaining six birds from each group were then maintained at 6 C with water but no food for 5 to 7 more days. The resultant 18 to 20% weight-loss corresponded to the 50 to 75% utilization of the total carcass lipid. The 14-C content of the extracted DDT and its metabolites was measured by liquid scintillation spectrometry. Starvation and cold did not alter the percentage of lipid or net DDT content of erythrocytes, plasma, liver or brain. There was a decrease of lipid in the heart muscle, but no change in the net DDT content. Conversely, the lipid content of the breast muscle, representative of the total body muscle, did not change, but the net DDT concentration increased significantly, demonstrating that starvation-induced changes in DDT content occur in adipocyte lipid and muscle tissue. Lipid utilization in the omental fat pad was accompanied by a net decrease in the total amount of DDT. This represented an increase in the concentration of DDT/g lipid, indicating that fatty acids were moving out of adipocytes more rapidly than DDT. As a result of stressing by starvation and cold, 0.45, 4.10 and 31.44 mg DDT/bird was moved from the adipose tissues into the muscle tissues of birds treated with 3.101, 32.07 and 335.0 mg DDT/bird, respectively. In the same dosage order, 0.072, 4.08 and 11.1 mg DDT/bird was irreversibly cleared from the system. That DDT is only relocated into the muscle tissue and not into the brain, liver, heart or blood, may protect DDT-sensitive tissues such as those of the central nervous system. DDT in the muscle tissues is not expected to cause cellular damage as it is probably located in the intracellular lipid droplets as seen in red muscle cells (Grinyer and George, 1969).

71-0807. Cory, L.; Fjeld, P.; Serat, W. (Dept. of Biology, Saint Mary's College, Saint Mary's College, Calif. 94575). **Environmental DDT and the genetics of natural populations.** *Nature 229(5280): 128-30; 1970.* (33 references)

The possibility of DDT residues being directly responsible for alterations in the genetic content of populations is discussed based on correlations between chromosomal changes in the fly *Drosophila pseudoobscura* as described over the past 24 years in the western U.S. and the distribution patterns of DDT residues found throughout the area. The configurations of inversions and combinations of inversions occurring in the third chromosome of *D. pseudoobscura* were named according to their area of discovery. The most relevant to this study are Arrowhead (AR), Chiricahua (CH), Pike's Peak (PP), and the standard or reference configuration (ST), of which the others were considered inversions. These different chromosomal forms were shown in laboratory tests to have differing genetic effects and can thus be regarded as a series of multiple alleles responding differentially to different selective

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product was identical to photodieldrin. Since many conversion products of pesticides are quite stable in the environment and photodieldrin appears to be more toxic to many forms of biological systems than the parent compound, further studies should be performed to determine the toxicological and persistance properties of photodieldrin.

71-0821. Friend, M., Trainer, D. O. (Dept. of Veterinary Science, U. of Wisconsin, Madison, Wis. 53706): Polychlorinated biphenyl interaction with duck hepatitis virus. *Science 170(3964): 1314-6; 1970.* (11 references)

Ten-day-old mallard ducklings were fed diets containing 0, 25, 50 or 100 ppm PCB (polychlorinated biphenyls) in the form of Aroclor 1254 for 10 days and after 15 days were injected i.p. with 1.5 times the LD50 of DHV (duck hepatitis virus) to determine the effect of PCB on the growth of the ducks and the possible interactions between organochlorine pollutants and infectious diseases. On day 11, the birds were weighed and every fifth bird was killed for tissue analyses. The remaining birds were then subjected to the virus tests. At the end of the 10-day trials, the heaviest body weights occurred in the birds fed the highest concentration of PCB (100 ppm) and the lowest weights occurred in those receiving no PCB in the diet. The trend appeared to be linear. The differences in body weights among treatment means were highly significant when tested by analysis of covariance. A similar analysis of liver weights disclosed highly significant differences within groups treated with PCB rather than between treated and untreated groups. Mortality levels of 44.4, 65.0, 35.0 and 14.3% were observed in ducks that had received 100, 50, 25 and zero ppm PCB in conjunction with DHV, respectively. None of the untreated controls died. The onset of mortality in all groups given PCB plus DHV began at least 8 to 16 hr before that in the control group treated with the virus only. At the 0.01 level of probability, the mortality levels occurring among the PCB/DHV groups were significantly higher than for ducklings receiving the virus only (*chi* square=7.49, d.f.=1). There was no significant difference in the mortality among ducklings receiving the different concentrations of PCB plus virus (*chi* square=3.79, d.f.=2). All ducks that died had gross pathognomonic liver lesions indicating typical duck hepatitis infection. Results from histological and residue analyses are not yet available. These results suggest that sublethal concentrations of PCB may render a host more susceptible to certain types of infectious agents and thereby also emphasizes the differences that exist between "sublethal" and "no-effect" concentrations of pollutants.

71-0822. Brown, C. B.; White, J. L. (Dept. of Science and Mathematics, Fort Valley State College, Fort Valley, Ga. 31030). Reactions of 12 *s*-triazines with soil clays. *Soil Sci. Soc. Am. Proc. 33(6): 863-7; 1969.* (16 references)

Twelve *s*-triazine herbicides were reacted with chloroform and water suspensions of soils of varying mineralogical composition and samples were withdrawn at intervals for infrared (IR) and nuclear magnetic resonance (NMR) analyses to investigate the hydrolysis or protonation reactions. Air-dried samples of 2 to 0.2 *mu* and of smaller than 0.2 *mu* fractions of the soils were prepared and incubated up to 67 days with saturated solutions of the technically pure compounds. In the first experiment, aliquots of the propazine, prometone and prometryne suspensions were removed at intervals and washed with the appropriate solvent to remove the excess compound. Potassium bromide pellets made from these air-dried samples were analyzed on a Perkin Elmer Model 421 IR spectrophotometer. A 1730- to 1710-cm adsorption band, which reached its maximum between 48 and 72 hr in chloroform, indicated the presence of the protonated and hydrolyzed species. The water in the aqueous solutions produced a broad peak at the 1630-cm region masking the 1740-cm region. This broad peak was narrowed by passing a current of air over calcium chloride and then directly over the pellet, allowing detection in the 1740-cm region. Deuteration and dessication in a vacuum were found to be unsuitable procedures. In the second experiment, air-dried samples of Wyoming bentonite (smaller than 2 *mu*) and 0.2-mm clay were suspended in separate saturated chloroform solutions of the 12 *s*-triazines. Potassium bromide pellets were prepared at 72 and 96 hr and analyzed by IR spectrography as in the first experiment. Soils with more than 3 parts in 10 of montmorillonite showed unquestionable signs of hydrolysis. The montmorillonite surface can provide protons for acceptance by unshared pairs of electrons of *s*-triazines. The basicity of the amines (their ability to donate electrons) determines their ease of protonation and adsorption. Hydrolysis follows a sequence opposite to protonation and adsorption as it is determined by the ability to accept electrons. It is also known that in any given series the dialkylamino group is adsorbed more than the corresponding monoalkylamino group. This helps to explain the observed order of hydrolysis of the chloro *s*-triazines (in descending order): trietazine, chlorazine, ipazine, propazine and atrazine. Atrazine and simazine were equal. It was calculated that a given chlorotriazine is likely to have an algebraic sum in favor of hydrolysis, greater than its methoxy or methyl-thio analogue. In a pair of *s*-triazines, chloro and methoxy, the chloro will adsorb less but the observed hydrolysis will be more. The reverse is true of the methoxy analog.

71-0823. Dubey, H. D. (Dept. of Agronomy and Soils Agricultural Experimental Station, U. of Puerto Rico, Mayaguez Campus, Rio Piedras, P. R. 00928) Effect of picloram, diuron, ametryne and prometryne on nitrification in some tropical soils. *Soil Sci. Soc. Am. Proc. 33(6): 893-6; 1969.* (16 references)

Four herbicides (picloram, diuron, ametryne and prometryne) were mixed into each of four types of Puerto Rican soil and incubated for 8 weeks to determine the effect on soil nitrification. Samples of Rio Piedras silty clay, Vega Alta silt loam, San Anton loam and Catano sand were passed through a soil screen with 2-mm openings and then dried. Wettable formulations of the title herbicides were applied to 50-g soil samples at concentrations of 2 to 100 ppm. The pH was then adjusted to near neutral and the samples were mixed to uniformly incorporate the additives. The samples were moistened to field capacity and the flasks were closed with Parafilm to prevent moisture loss and allow gaseous exchange.

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71-0841. Westoo, G.; Noren, K. (Dept. of Food Hygiene, National Inst. of Public Health, Stockholm, Sweden). Determination of organochlorine pesticides and polychlorinated biphenyls in animal foods. *Acta Chem. Scand.* 24(5): 1639-44; *1970*. (4 references)

A newly devised method is presented for determining by gas-liquid chromatography (GLC), preceded by thin-layer chromatography (TLC), the presence of such organochlorine pesticides (OCP) as DDT, DDD and DDE and interfering PCBs (polychlorinated biphenyls) in foods of animal origin. Extraction, cleanup and GLC are by the method of Noren and Westoo (1968) whereby dieldrin, heptachlor epoxide, *p,p'*-DDD and -DDT (area I) can be separated from *p,p'*-DDE, *o,p'*-DDT, -DDE and PCB (area II). The analytic difficulties are in separating and determining area II compounds. Usually, *p,p'*-DDE is the only OCP compound in this extract and all but two of 14 PCBs can be determined by gas chromatography in the presence of suitable standards. *o,p'*-DDT and -DDE are rarely present in foods of animal origin; both of these and *p,p'*-DDE can be oxidized by chromic acid without affecting PCBs. When from 0.1 to 1 mcg *p,p'*-DDE/ml is present prior to oxidation (if more is present the solution is diluted), a peak of *p,p'*-dichlorobenzophenone is seen in the gas chromatogram at about the same retention time as PCB (peak 2). If aldrin and heptachlor are present, they will appear in the *p,p'*-DDE and PCB area of the TLC. They do not interfere. After extraction and cleanup, a special process is followed if PCB is present. The cleaned-up extract is placed in the gas chromatograph; the content of lindane, *alpha*- and *beta*-BHC, heptachlor and aldrin may be calculated from the chromatogram. Two portions of the extract (corresponding to about 4 and 5 g of foodstuff) are concentrated to about 0.1 ml; TLC is performed on aluminum oxide, plating the samples together with standards. The areas for the 5-g samples are eluted with heptane and covered with foil. The standard and uncovered sample areas are sprayed according to the procedure for OCP and the compounds are identified under UV light. When the spots of OCP are visible, areas I and II of the covered samples are collected separately in tubes. These are treated with hexane and methanol, water added, shaken, centrifuged and the water layers discarded. The remaining methanol is removed from the hexane by shaking; the extracts are dried with anhydrous sodium sulfate. A sample of each extract is set aside for gas chromatography; then dehydrohalogenation or oxidation is continued. When more than 1 mcg/ml *p,p'*-DDE is likely to be present in the area II extract (A), this is diluted to less than 1 mcg/ml (extract B) to facilitate oxidation. If *o,p'*-DDT appears to be present, the area II extract (A or B) is refluxed with 2 N sodium hydroxide; the condenser is rinsed with hexane. The cool solution is transferred with hexane to a separatory funnel; the water layer is rejected, the hexane solution washed twice with water, quantitatively transferred to a graduated tube and extract C concentrated. A, B, or C is treated with chromic acid. The hexane layer is twice washed with water and dried with anhydrous sodium sulfate. The oxidized extract is injected into the gas chromatograph. The results are compared with the chromatograms of the cleaned up food extract, the extracts of areas I and II from the TLC, the OCP standard and the PCB standard. Quantitative details of gas and TLC chromatograms are provided.

71-0842. Booth, M. D.; Fleet, B. (Dept. of Chemistry, Imperial College of Science and Technology, London, England). Electrochemical behavior of triphenyltin compounds and their determination at submicrogram levels by anodic stripping voltammetry. *Anal. Chem. 42(8): 825-31; 1970.* (21 references)

The electrochemical behavior of triphenyltin compounds in nonaqueous solution was studied by polarography, controlled potential electrolysis and cyclic voltammetry with the aim of developing a sensitive method of analysis for the determination of trace amounts of these compounds, such as in fungicide residue analysis. Radical ions of the test compounds were formed and then reduced to the triphenyltin anion. Polarographic studies were conducted with triphenyltin stannic acetate and hydroxide in an ethanol-water medium. The appearance of a prewave in the polarographic meth[od] showed that there was strong adsorption at the mercury surface of the radical ion. This phenomenon was used in the determination of trace amounts of organotin compounds in solution by means of anodic stripping voltammetry. The analytical method was also utilized in the determination of triphenyltin acetate (fentin) in potato samples. The skins of fentin-treated potatoes were removed, weighed, dried at 90 C for 60 min and then extracted with acetonitrile. The extracts were dried on a column containing anhydrous sodium sulfate to remove the remaining water and passed over alumina to remove oils and starchy materials. The column was then rewashed with acetonitrile. Samples from the first ¼-in surface layer of the potato and from the bulk of the potatoes were prepared for analysis in the same manner as was the skin. The residue-containing liquid was placed in the cell for stripping analysis and mixed with buffer and Triton X-100. The mixture was diluted to contain 50% v/v ethanol and assayed by an assembly equipped with rotating mercury-coated platinum electrodes. Almost all of the fentin residue in the treated potatoes was in the first ¼-in layer of the vegetable. The levels of fentin found in the skins of three of five sample lots contained from 0.001 to 0.05 ppm. Concentrations in the next ¼-in layer ranged from 0.001 to 0.1 ppm, while the levels of fentin in the bulk of the potatoes tested were 0.001 ppm or undetectable.

71-0843. Koen, J. G.; Huber, J. F. K. (Lab. for Analytical Chemistry, U. of Amsterdam, Nieuwe Achtergracht 129, Amsterdam, The Netherlands). **A rapid method of residue analysis by column liquid chromatography with polarographic detection; application to the determination of parathion and methylparathion on crops.** *Anal. Chim. Acta 51(2): 303-7; 1970.* (4 references)

A rapid, sensitive and simple method is described for the determination of methylparathion and parathion residues on crops. Known amounts of parathion (0.27 to 2.02 ppm) and methylparathion (0.20 to 1.60 ppm) in ethanol were added to 50 g portions of coarsely cut lettuce which were then set aside to allow the ethanol to evaporate and for the pesticide to become well-absorbed by the plant material. The treated lettuce was then macerated for 4 min in a food blender with 100 ml ethanol and 50 g of anhydrous magnesium sulfate. The mixture was left in a closed beaker for 1 hr and then

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centrifuged to separate the solvent from the solid material. Five ml of the extract were transferred to a centrifuge tube and treated with an equal volume of an acetate buffer which was prepared by mixing 15 g of acetic acid with 4 g of sodium hydroxide in 1 L of water. The resulting green precipitate was removed by centrifugation. The resulting pale yellow-green sample solution had about the same composition as the eluant. The eluant mixture consisted of 60.1% water, 38.8% ethanol, 0.80% acetic acid, 0.21% sodium hydroxide and 0.09% potassium chloride (w/w) saturated with 2,2,4-trimethylpentane (isooctane). One hundred mcl of the clear sample solution were analyzed, in a liquid chromatograph with polarographic detection (Knox *et al.*, 1970). The chromatogram was obtained in 5 min. The colored compounds in the sample solution were completely retained by the column but did not interfere with further chromatographic separations. When the column was reloaded with the stationary phase isooctane, the colored substances were removed by the excess isooctane. Recovery rates were as high as 90% for methyl parathion and as high as 100% for parathion. The limits of the analysis were about 0.00.3 ppm.

71-0844. Valenzuela Calahorro, C.; Barea Cuesta, E.; Gaitan Perabad, M.; Navarrete Guijosa, A.; Lopez-Gonzalez, J. de D. (Departamento de Quimica Inorganica, Facultad de Ciencias, Universidad de Granada, Granada, Spain). **Spectrophotometric determination of simazine.** *Anales Quim. 66(2): 149-56; 1970.* (28 references) (Spanish)

A spectrophotometric method of analysis for simazine is proposed which avoids interference from hydroxysimazine, the latter being insoluble in the solvent used, cyclohexane. The simazine used was of 99.8% purity and recrystallized several times in ethanol; the cyclohexine was of spectrophotometric purity. Because simazine dissolves very slowly in cyclohexane at room temperature, the two were bubbled in a reflux for 3 hr; 12 different solution concentrations were prepared ranging from 0.10 to 8.00 mcg/cu cm. The same method was used to prepare a saturated solution of hydroxysimazine in cyclohexane. Spectrophotometric analysis of the latter resulting solution showed that no spectrophotometrically detectable hydroxysimazine existed in it. In other tests, it was proved that simazine does not alter the solubility of hydroxysimazine and *vice versa*. Using UV radiation absorption, the various solutions were analyzed on a Beckman DU-2 spectrophotometer with 1-cm quartz windows. By the method of least squares, the extinction coefficient was found by the formula: K=0.1881 X absorbancy units/*gamma*/cu cm. Simazine solutions in the range of 0.5 to 4.8 mcg/cu cm obeyed Beer's law. The best interval for applicability of the method was that from 1.5 to 4.8 mcg/cu cm, which followed the criterion of Ringbom. Data on all the calculations are given.

71-0845. Bahuja, G.; Franco, J. M.; Morado, M. A.; Pereiro, M. E. (Instituto de Quimica Organica, Centro Nacional de Quimica Organica, Madrid, Spain). **Contamination of the environment by organochlorine pesticides. IV. Polychlorinated biphenyls and their interference in the [illegible] of chlorinated insecticides by gas-liquid chromatography.** *Anales Quim. 66(2): 157-66, 1970.* (13 references) (Spanish)

The results are presented of the study of two samples of polychlorinated biphenyls (PCBs), as part of an international program of the OECD on environmental contamination by organochlorine pesticides. These were analyzed by gas-liquid chromatography (GLC), with detection and quantification of the PCBs by electron-capture detection. The PCBs were Clophen A50 and its isomeric fractions. Sample 1 contained five isomers of commercial Clophen A50 dissolved in petroleum ether; the five were detected on SF-96 and QF-1 columns but each peak could have contained other isomers not separable on these two columns. Sample 2 was 100 mcl of a standard mixture of Clophen A50 dissolved in the same solvent. Aliquots (0.5 and 5 mcl) were injected into the chromatographic columns to test their efficiency and the linearity of the detector. Aldrin served as a reference. Two types of chromatographs were used: a Perkin-Elmer Model 21 adapted for electron-capture detection and (A) the same firm's Model F-11 with an electron-capture detector fitted (B). The columns were: A—a mixture of 7.5% QF-1 and 5% DC-200 on Chromosorb G, AW-DMSC (80/100 mesh) and B—15% QF-1 on Gas Chrom Q, AW-DMSC (60/80 mesh) and 10% DC-200 on the same solid support. The gas carrier for A was a 5% mixture of argon and methane and for B, 99.99% nitrogen. Tritium was the radiation source for both apparatus. The recorder was a Siemens device for A and a Hitachi one for B. The temperatures for A were: 220 C (injector), 190 C (column) and 190 C (detector). The corresponding temperatures for B were 220, 180 and 195 C. In general, the B group gave operating conditions with much higher sensitivities than with A; peaks recorded were more symmetrical, allowing ease of calculation. Perfect proportionality was observed between peak areas and the quantities of each PCB isomer. Quantitative determination of PCB isomers by gas chromatography is not easy due to the large number of compounds that can be present. The full data from the analyses are tabulated, including the interferences found between the PCB isomers and an extract of homogenized egg contaminated with chlorinated insecticides such as lindane, heptachlor, aldrin, *p,p'*-DDE, dieldrin, etc. The PCB isomers are resistant to treatment with concentrated sulfuric or nitric acid, while the organochlorine insecticides are not (except for *alpha*-BHC and lindane). This fact serves as the basis for a procedure to determine the existence of PCBs in a substrate and their possible interference with organochlorine insecticides. A future article will cover the quantitative results of a study of such interferences in the analysis of sardines taken from the Wadden Sea, Holland, in June 1968. Also to be published are the results of finding PCBs in various terrestrial and aquatic species in Spain.

71-0846. Jaglan, P. S.; Gunther, F. A. (Dept. of Entomology, U. of California, Riverside, Calif. 92502). **Determination of partitioning values of parathion-methyl and related compounds.** *Analyst 95(1133): 763-5, 1970.* (6 references)

The p-values (partitioning values) of methyl parathion and some related compounds were determined by gas-liquid chromatographic (GC) analysis and compared with partition coefficients determined for some of these compounds by radiotracer methods. A known amount of methyl parathion or methyl paraoxon was dissolved in a benzene-water-methanol

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decarboxylation of herbicide acids have been useful to the analyst. Automated pesticide residue analysis, mass spectrometry and other approaches including nuclear magnetic resonance spectrometry, ultraviolet, visible, infrared and fluorescence spectrometry, as well as oscillographic polarography and isotope techniques are other procedures which are currently expected to be modified or replaced to enable the analyst to detect even smaller quantities of toxicants and their metabolites.

71-0876. Mestres, R., Campo, M.; Tourte, J. (Laboratoire de Chimie Appliquee a l'Expertise, Faculte de Pharmacie, 34 Montpellier, France). Examination and determination of thiabendazole in citrus fruit: Whole fruit, juices and pulps. *Trav. Soc. Pharm. Montpellier 30(3): 193-202, 1970.* (12 references) (French)

A method for the identification and determination of thiabendazole (2-(4-thiazolyl) benzimidazole) in citrus fruit and their juices is presented. Thiabendazole is more commonly employed as an anthelmintic but has also been used as a fungicide. Fruits to be analyzed were quartered and a homogeneous pulp was prepared from the opposing quarter sections. Twenty-five g of fruit pulp were placed in a 1-L vessel with 2.5 ml of concentrated ammonia and 75 ml of ethyl acetate and mixed in a mixer at a moderate speed for 20 min. The extract mixture was filtered through Pyrex wool. The filtrate was extracted again with 50 ml of ethylacetate for 20 min. The combined ethyl acetate extract was treated twice with 20-ml portions of 1 N sodium hydroxide and agitated for 5 min. The organic phase was then washed twice with 5 ml of distilled water and reextracted three times, twice with 10-ml portions of 0.1 N hydrochloric acid (HCl) and once with 5 ml of 0.1 N HCl. The organic phase was then discarded. The aqueous phase was placed with 5 ml of 1 N sodium hydroxide, 5 ml of a sodium acetate and sodium chloride mixture and 25 ml of ethyl acetate in a 125-ml separatory funnel and shaken for 5 min. The phases were allowed to separate completely. The aqueous phase was thrown away. The ethyl acetate phase was washed with 10 ml of distilled water and treated with 10 ml of 0.1 N HCl saturated with ethyl acetate. The extract was then analyzed spectrophotometrically as detailed. The results were compared to those obtained for the reference solutions. Fruit pulp and juice were extracted with a mixture containing crystallized sodium sulfate, concentrated ammonia and ethyl acetate as detailed. Extracts were purified with the help of sodium hydroxide and a mixture of sodium acetate and sodium chloride and then analyzed spectrophotometrically. Recoveries for thiabendazole were in the order of 80 to 100%.

71-0877. Mestres, R.; Illes, S.; Cornet, R.; Gillet, M. (Laboratoire de Chimie Appliquee a l'Expertise, Faculte de Pharmacie, 34 Montpellier, France). Procedure for the preparation of purified petroleum ether for the analysis of pesticide residues. *Trav. Soc. Pharm. Montpellier 30(3): 219-25; 1970.* (5 references) (French)

A technique for the purification of petroleum ether from special G essence (Schell) for the analysis of pesticide residues is described. The method involved oxidation with perhydrol and treatment of the preparation with nascent hydrogen. The quality of the product is very good and permits the gas chromatographic analysis of pesticide residues with electron-capture detection to be carried out with a minimum of interference from unsaturated hydrocarbons. A modification of a method reported earlier (*Ann. Fals. Expert. Chim. 62(685): 75-85; 1969*; for an abstract see 70-0981) for the analysis of pesticide residues in natural waters is presented. Instead of the triple extraction of 500-ml water samples with 200, 200 and 100 ml of petroleum ether, three extractions with 200, 100 and 100 ml of a mixture containing equal volumes of petroleum ether (purified as described herein) and sulfuric ether are substituted. The ether phases are dried on 10 g of anhydrous sodium sulfate before being evaporated to about 10 ml prior to elution from a Florisil column. The modified method gives a better yield for polar compounds and permits the investigation of a wider range of compounds in addition to the organochlorine and organophosphate pesticides.

71-0878. Mestres, R.; Illes, S.; Chevallier, Ch. (Laboratoire de Chimie Appliquee a l'Expertise, Faculte de Pharmacie, 34 Montpellier, France). DDT was not guilty: the case of [illegible] residues in pollen. *Trav. Soc. Pharm. Montpellier 30(3): 227-35; 1970.* (14 references) (French)

Traces of chlorinated plasticizers closely resembling DDE, aldrin and lindane were identified in pollen samples which had been stored in plastic sacks for several months. Two pollen samples from a lot believed to contain 0.45 mg/kg HCB, 0.25 mg/kg *gamma*-HCH, 0.65 mg/kg aldrin and 1.5 mg/kg DDE were submitted for verification analysis. Twelve g of pollen were pulverized with a mortar and then placed in a mixer with 100 ml of acetonitrile for 20 min. The extract was filtered through Pyrex wool, allowed to evaporate and treated with 40 ml of pure petroleum ether. Residues were eluted from a Florisil column. Gas chromatographic analysis was carried out on columns with QF-1 using equipment with a tritium electron-capture detector. Further analysis was carried out using gas chromatographic apparatus equipped with a Ni-63 electron-capture detector with a DC-200 column. In addition, residue samples were chromatographed a third time on a DC-200 column using apparatus equipped for microcoulometric detection. Evaluation of the data obtained led to the conclusion that the organochlorine residues found in the pollen samples originated from a nonpesticide source. Polyethylene sacks which were used to store pollen samples were considered as a possible source of the contaminant. A sample of the sacks was washed in water. Ten mg of the plastic film was then extracted with 100 ml of petroleum ether. The extract was gas-chromatographed using the above mentioned methods and further analyzed using IR spectrophotometry. Pollen samples were also subjected to IR spectrophotometric analysis. The analyses confirmed the presence of chlorinated biphenyls in the samples. The concentrations of chlorinated biphenyls found in the plastic bags ranged from 0.3 to 0.5 g/kg. The corresponding value for the pollen was about 6 mg/kg. The findings showed that food stored in plastic containers can become contaminated by the chlorinated

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plasticizers which are present at low concentrations in the plastic material. Scientists should be careful in interpreting the organochlorine pesticide residue levels in test samples, especially in those samples which have been stored in plastic containers.

71-0879. Mestres, R.; Chevallier, Ch. (Laboratoire de Chimie Appliquee a l'Expertise, Faculte de Pharmacie, 34 Montpellier, France). Determination and evaluation of organochlorine pesticide residues in blood. *Trav. Soc. Pharm. Montpellier 30(3): 237-41; 1970.* (3 references) (French)

Three methods for analyzing organochlorine insecticide residue levels in blood were evaluated. A method involving acetone extraction and elution on a silica gel column which was employed by Richardson *et al.* (1967) to determine levels of dieldrin in blood was used in the determination of zeidan in blood. Various foreign organochlorine compounds interfered with the analysis of pesticide residues. The interfering substances were found to be chlorinated plasticizers in the Merck silica gel. Analytical results were unsatisfactory even after washing the silica gel with acetone, sulfuric ether and methanol. Recoveries ranged from 30 to 50%. The second method of analysis was the one used by Paubionsky (1969) to determine pesticide residue levels in the blood of pesticide factory workers. One-ml blood samples were treated with 3 ml of petroleum ether. Residue samples were then analyzed by direct method using a Microtec chromatograph equipped with a Ni-63 electron–capture detector. Recoveries of 90% for dieldrin and about 85% for zeidan were obtained when this method was used to analyze blood samples containing 0.5 ml/l of either insecticide. The third method of analysis discussed was described by Grosby and Archer (1966). One ml of blood was mixed with 2 ml of an alcohol-potash mixture and heated for 15 min in a water bath at 75 to 80 C. The mixture was cooled under cold running water and treated with pentane or petroleum ether. The ether phase was then chromatographed with the aid of a tritium electron-capture detector. Zeidan (in the form of DDE) and dieldrin recoveries ranged from about 85 to 95%. For pesticide levels under 0.02 mg/l the results obtained with the two latter methods of analysis are almost impossible to verify by microcoulometry. Such verification can be easily obtained when pesticide residue levels are 0.05 mg/l or greater.

See also 71-0657, 71-0701, 71-0720

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