U. of Wisconsin, Madison, Wis. 53706). Significance of chlorinated hydrocarbon residues to breeding pelicans and cormorants. *Can. Field-Nat. 83(2): 91-112; 1969.* (65 references)

The levels of chlorinated hydrocarbons present in eggs and spring foods of double-crested cormorants (*Phalacrocorax auritus*) and white pelicans (*Pelecanus erythrorhynchos*) are reported and the effects of these residues on the reproductive physiology of these species are discussed. Sampling was conducted in the summer of 1965 on 19 lakes and impoundments in 10 watersheds of the prairie states and of provinces of Canada. Pesticides used locally in most of the study areas included most commonly DDT, aldrin, dieldrin, sevin, toxaphene and mercury seed dressings. Industrial pollutants included the polychlorinated biphenyls (PCBs). A total of 329 fish were pooled for analysis and 89 cormorant and 54 pelican eggs were collected and analyzed by the methods outlined by the U. S. Food and Drug Administration (1965). Recoveries, using this procedure, from egg and tissue samples spiked with DDE, TDE, DDT or dieldrin with levels greater than 0.05 ppm were found to be 85 to 100%. In order to separate the PCBs from the chlorinated insecticides, five extracts of eggs were randomly selected from the original series, rerun again on the gas chromatographs in 1969, then treated with alcoholic potassium hydroxide and analyzed again by gas chromatography. Results showed that there was no significant PCB interference in the determination of DDE. No fish pools approached levels greater than 0.1 ppm of DDE and no dieldrin values for fish exceeded 0.015 ppm. Heptachlor epoxide, endrin, aldrin and toxaphene were not detected in any of the fish pools. PCB residues were detected in all fish samples in trace amounts. The mean residues for cormorant and pelican eggs were higher than those for fish. Dieldrin, DDE and PCBs were universal in all the egg pools, whereas heptachlor epoxide (0.3 to 0.5 ppm) was detected in only three cormorant egg pools. The highest cormorant and pelican egg residues were 45.0 and 4.8 ppm of DDE and 28 ppm and trace amounts of PCBs, respectively. The residues were low enough to cause no alarm from an acute toxicity point of view. The major interspecific differences between the egg residues in pelicans and cormorants were probably due to dissimilar nonbreeding-area exposures. The correlation coefficients suggest that in both species measurable declines in shell weight and thickness can be related to the lowest residues of DDE and PCB. There does not appear to be a minimum effective level concerning changes in eggshell. In general, the population status of a given colony can be related to the residues and shell thickness of the eggs from that colony. Other ecological factors complicate the situations and probably modify them.

70-0450. Mestres, R. (Faculte de Pharmacie, U. of Montpellier, Montpellier, France). Pesticides in citrus fruits on the French market. *Proc. Intern. Citrus Symp., 1st, Riverside, Calif., 1968. 2: 1035-42; 1969.* (20 references)

The pesticide residues in citrus fruits sampled at the wholesale level in France were investigated. The extraction of a weight of rind equivalent to 75 g of whole fruit was first performed with isopropyl alcohol followed by purified petroleum ether. The ether phase was separated, dried and concentrated to 7.5 ml. Five ml of this extract (equivalent to 50 g of whole fruit) was used for gas chromatographic analysis of three different eluates from a Florisil column (Mestres, 1967) and unactivated with 5% water before use (Moats, 1963). The first eluate given by 100 ml of petroleum ether separated sulfur and 13 commonly used chlorinated pesticides. The two following eluates, each one obtained from 50 ml of a mixture of petroleum ether-diethyl ether (80+20) separated two other groups of products which are tabulated. Data present the minimum amount detected by chromatography, the recovery and the theoretical minimum detectability. Recoveries generally averaged between 80 to 90%. The identification was achieved by three specific chromatographic detectors: microcoulometric with the silver then with the sulfur cell and thermionic according to Giuffrida (1964) with a home-made potassium carbonate fused tip. Thirty-nine pesticides, most of which are generally used for citrus production, were satisfactorily recovered. The residues in citrus fruits were low and often nil. Small residues of parathion, ethion, fenitrothion, methyl parathion, Kelthane, lindane, dieldrin, tedion and dichlofluanid were detected. For the determination of biphenyl and *o*-phenyl phenol, 12 g of chopped rinds were first treated with isopropanol and cyclohexane and then reextracted with cyclohexane. Screening for biphenyl was performed by gas chromatography of the cyclohexane phase. Subsequent quantitative analysis (85 to 95% recovery) was done by ultraviolet spectrophotometry of a dichromate-oxidized cyclohexane extract. Recovery of *o*-phenyl phenol by a described method was 73 to 81%. Data demonstrated that Spanish exporters do not use biphenyl, but use *o*-phenyl phenol. This compound was found in a limited number of samples from Egypt, Tunisia, Algeria and Morocco. Biphenyl is greatly used in Israel, Cyprus, Italy and Greece. The mean value was 33 ppm for lemons imported from Cyprus, Italy and Greece and 36 ppm for those from Israel. Residues over tolerance were found with increasing frequency (in 6 to 17% of the samples) in citrus fruits imported from Italy, Cyprus, Greece and Israel. *o*-Phenyl phenol was found in very low residues from these countries, although 11 ppm was found in one sample.

See also **70-0421, 70-0426, 70-0433, 70-0434, 70-0499, 70-0500, 70-0504, 70-0524, 70-0531, 70-0536, 70-0537, 70-0538, 70-0547, 70-0548, 70-0549, 70-0550, 70-0553**

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