

Pesticide Levels in the Omental Fat of Florida Raccoons

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Since 1969, the Veterinary Public Health Section of the Florida Division of Health has utilized the raccoon, Procyon lotor, as an environmental indicator of selected microbial disease agents and chemical pollutants. Despite heavy usage of pesticides connected with agriculture and in control of insects of public health importance, residue levels of organo-chlorine and organophosphate compounds have not been previously determined for this species in Florida (THOMPSON, 1973). Residues to mirex, however, have been reported in raccoons from estuarine areas of South Carolina (BORTHWICK, et al., 1973). Consequently, pesticide residue levels were measured in 20 raccoons from southern Florida and in four raccoons from North-eastern Florida.

Methods and Materials

Raccoons from southern Florida were live-trapped in Sarasota and Collier Counties. All animals were captured while feeding in tidal areas of mainland Sarasota County or on islands just off the gulf coast of both counties. The raccoons from Sarasota County were animals which lived in urban situations, with several being captured along Phillippi Creek, the main drainage system for the county, especially the agricultural eastern portion. Raccoons from Collier County were collected in red mangroves, Rhizophora mangle, on Marco Island. This island is currently undergoing development by dredge and fill techniques. Existing communities on the island do practice spraying and fogging for mosquitoes and biting gnats. The raccoons, however, were collected from unsprayed areas adjacent to these communities and development. The four raccoons from north-eastern Florida were captured on a military reservation along the St. John's River, Duval County.

Each raccoon was euthanized with sodium pentobarbitol and all omental fat collected, wrapped in aluminum foil and transported on dry ice to the laboratory. Fat samples were extracted with petroleum ether and partitioned against acetonitrile. The extract was then subjected to fractionation on a florisil column, (MILLS, 1961; MILLS et al., 1963). Analysis was by tritium foil electron capture gas chromatography, using a Tracor MT-220 instrument with two differing columns. Thin layer chromatography (ultra-violet light/ AgNO_3) was used as a confirmatory procedure. The following parameters were observed:

Columns: 1.6% OV-17, 6.4% OV-210 on Supelcoport, 100-120 mesh.
5% OV-210 on Chromosorb W-HP, 100-120 mesh.

Temperatures: Columns 200°C; Injection Chamber 225°C;
Detector 210°C.

Carrier Gas Flow: (nitrogen) OV-17, OV-210, 60ml/min;
OV-210, 45 ml/min.

Table 1

Pesticide Residues (ppm) in Fat Samples from Raccoons of Collier County, Florida¹.

Pesticide ² .	Raccoons											
	Adult Male	Adult Male	Adult Male	Adult Male	Adult Male	Adult Female	Adult Female	Adult Female	Adult Female	Adult Female	Adult Female	Adult Female
Beta-BHC	2.30	0.21	0.60	0.14	0.11	0.18	0.59	0.10	0.27	0.74		
Aldrin	--	--	--	--	0.09	--	--	0.06	0.03	0.09		
Dieldrin	2.30	0.21	0.20	0.05	--	0.09	0.14	--	0.04	--		
Octachlor epoxide	4.61	0.27	0.60	0.19	0.08	0.18	0.59	0.21	0.17	0.26		
Heptachlor epoxide	1.53	0.10	--	0.11	0.04	0.04	--	0.08	0.09	0.13		
o,p'-DDT	1.53	0.16	0.20	0.14	--	0.04	0.44	0.30	0.05	--		
p,p'-DDT	1.53	0.21	0.40	0.14	0.04	0.14	0.29	0.32	0.09	0.51		
p,p'-DDE	1.53	2.27	0.80	0.26	0.23	0.18	0.44	0.17	0.23	0.49		
p,p'-DDD	--	0.16	--	--	--	--	--	--	--	0.16		
Methoxychlor	3.07	0.16	0.20	0.42	--	0.18	0.74	1.78	--	--		

1. All values adjusted to 100% extractable lipid content.

2. Residue levels were not found for Alpha-, Gamma-, or Delta-BHC, o,p'-DDE, o,p'-DDD, ethyl or methyl parathion, diazinon, 2,4D, and polychlorinated biphenyls.

Table 2
Pesticide Residues (ppm) in Fat Samples from Raccoons of Sarasota County, Florida¹.

Raccoons											
Pesticide ² .	Adult Male	Adult Male	Adult Male	Adult Male	Juv. Male	Juv. Male	Adult Female	Adult Female	Adult Female	Adult Female	Adult Female
Alpha-BHC	--	--	--	--	--	--	--	--	--	--	0.17
Gamma-BHC (Lindane)	--	0.06	0.02	--	--	0.12	0.02	0.03	--	--	--
Beta-BHC	0.18	--	--	0.12	--	0.28	--	--	0.17	0.50	--
Aldrin	--	0.09	--	--	--	--	--	--	--	--	--
Dieldrin	0.04	0.19	0.26	0.20	0.30	0.08	0.06	0.12	0.02	0.65	--
Octachlor epoxide	0.19	0.19	1.35	0.73	0.52	0.60	0.15	--	0.10	2.90	--
Heptachlor epoxide	0.07	--	0.37	0.15	0.13	0.12	0.13	0.38	0.02	0.38	--
o,p'-DDT	0.11	0.31	0.51	0.53	0.17	0.12	--	0.47	0.10	0.12	--
o,p'-DDE	--	--	--	--	--	--	--	0.09	--	--	--
o,p'-DDD	--	--	--	--	--	--	--	0.06	--	--	--
p,p'-DDT	0.14	0.41	--	3.25	0.22	0.12	--	--	0.15	0.43	--
p,p'-DDE	0.33	1.34	0.40	0.72	1.30	0.52	0.17	0.06	0.25	3.30	--
p,p'-DDD	0.03	0.25	--	0.08	--	0.20	0.13	--	--	--	--
Methoxychlor	--	2.68	--	--	--	0.20	--	--	--	36.82	--

1. All values adjusted to 100% extractable lipid content.

2. Residue levels were not found for Delta-BHC, heptachlor, ethyl or methyl parathion, diazinon, 2,4D, and polychlorinated biphenyls.

Results and Discussion

Omental fat samples from Collier County raccoons (Table 1) contained residues to fewer compounds than did those animals from Sarasota (Table 2) and Duval Counties. Residue levels were low with no appreciable difference between the three populations sampled. While trans-nonachlor was present in all samples, it was not quantitated due to a lack of pure standards and is not shown in the tables. An adult female raccoon from Sarasota County had a methoxychlor level of 36.82 ppm., the significance of which is unknown. Since residues to mirex were not detected, comparisons with (BORTHWICK et al., 1973) cannot be made.

Of interest was the fact that PCB compounds were not detected in fat samples from Collier and Sarasota County raccoons but were detected in all four animals from the military reservation in Duval County. This observation is not an artifact of technique for all collections were made in the same manner and in the laboratory, fat samples from the Duval and Collier County raccoons were tested in the same run. The PCB compounds were not identified.

The low level of pesticide residues in raccoons tested is in agreement with observations made on other Florida wildlife (THOMPSON, 1973). Consequently, in the three counties sampled, the raccoon populations may have potential as environmental monitors for future increases in pesticide pollution associated with projected development of these areas.

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