include exclosure experiments, are under way within the area.

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DDT in Antarctic Snow

Contamination of the environment by persistent pesticides is universal[1-11]. Residues have been found in a variety of animals in the Antarctic[12,15]; analysis of two samples of glacial ice from the vicinity of Byrd Station (80° S, 119° W) gave negative results[13], but traces of dieldrin and DDT have been found in biota on Signy Island in the Antarctic, 3,000 miles from McMurdo Sound. The ecological implications of these contaminants have been discussed[14,15].

In 1966 we prepared six carbon adsorption filters (Nuchar *C*-190) for sampling snow melt[16,17]. Desorption efficiency is assumed to be 100 per cent at 72 h of extraction time, though adsorption efficiencies are not known. Five filters were shipped to Plateau Station and one was held in our laboratory as a control. The control sample was negative for DDT. Filters were installed in parallel with the Plateau Station water system for various periods of time from January 18–25, 1967. The snow being melted had fallen in the previous two months, November–December 1966, and in early January 1967. The flow rate measured at the station through the automatic flow valves without the filter attached was 1,035 ml./min. The Institute of Polar Studies, Ohio State University, sampled the snow melt in the Antarctic.

The resulting samples ranged from 321 to 429·6 l. One sample (No. 1) volume is unknown, but is greater than 15·5 l. After the filters reached the laboratory, the excess water was drained and the carbon was placed in a soxhlet extractor for 72 h. Cycle time for the 2,600 ml. double distilled reagent grade hexane solvent averaged 61 min, and subsequently each sample was washed in the soxhlet approximately 72 times. The hexane was decanted from the extractor into glass stoppered flasks and stored.

About 6 months later, in January 1968, the samples were reduced in volume to approximately 25 ml. with a flash evaporator operated at 40° C. Detection systems for DDT residues consisted of: (1) gas chromatograph, Barber Colman, series 5000, electron capture detector, tritium foil, 1·83 m glass column (inside diameter 5 mm), 1 : 1 mixture of 15·2 per cent QF-1 and 10·5 per cent DC 200 on 'Gaschrom' Q 100/200 mesh, column temperature 188° C, detector temperature 208° C, injector temperature 210° C, gas flow N_2 120 ml. per min. (2) Thin layer: Eastman type K 301R2, 98 : 2 heptane–acetone solvent developer, silver nitrate–phenoxyethanol–acetone chromogenic agent. Results were checked with US Public Health Service standards. One of our samples (No. 6) was subsequently checked by the Pesticide Analytical Laboratory, Faculty of Entomology, Ohio State University, with gas chromatography and microcoulometry. Detection equipment was: (1) Gas chromatograph, Barber Colman, series 5000, electron capture detector, tritium foil, 1·22 m glass column (inside diameter 5 mm), 1 : 1 mixture 15 per cent QF-1, 10 per cent DC 200 on 100/120 mesh 'Gaschrom' Q, column temperature 200° C, detector temperature 209° C, injector temperature 210° C, gas flow N_2 200 ml. per min. (2) Microcoulometer, detector attached to Barber Colman chromatographic oven, Dohrmann model C-200-A, 1·83 m column, inside diameter 5 mm, 7·5 per cent QF-1, 5·2 per cent DC 200 on silanized 'Chromosorb' W 60/80 mesh, column temperature 200° C, combustion chamber temperature 800° C, combustion cell T-300-S-silver, gas flow N_2 150 ml. per min.

All samples were carefully stored at all times to prevent contamination in our laboratories. The control sample, taken directly from the filter and extracted, contained substances which interfered with the gas chromatograph analyses. Further control samples of charcoal from the same bag were washed with 38 l. of double distilled water and found to be negative for DDT contamination when subjected to the clean-up procedure used for the sample from the Antarctic. I assume that the experimental samples were not contaminated either during transit or in the laboratory: no pesticides are used at Plateau Station.

Three of the five samples were positive for DDT, but only one was quantified. In the sample analysed by the Pesticide Laboratory the amount of *o,p'*- and *p,p'*-DDT (29·2 and 70·8 per cent respectively) was $0{\cdot}04 \times 10^{-9}$ g/g from sample No. 6 which came from 321 l. of snow melt. Minimum detection level was 5×10^{-12} g/g *p,p'*-DDT. Two other samples were positive for DDT, one of 263·8 l. ($> 0{\cdot}04 \times 10^{-9}$ g/g) and the other (No. 1) of unknown water quantity. Persistent pesticides are readily transported in air[3,11] and can be vaporized into the air from soil and water without evaporation of water[18]. Up to $1{\cdot}3 \times 10^{-9}$ g/g DDT has been found in rain in Ohio[11]. From studies[19,20] of air mass movements over the Antarctic Continent it seems that insertion of contaminated air is readily possible. The volume of snow on the continent has been estimated at 24–30 million cubic km[21]. The average precipitation has been reported as 19·8 cm/yr[19]. If the residue level determined from one sample at one location is extrapolated to the entire continent for the 22 year period in which DDT has been widely used, it suggests that there could be as much as $2{\cdot}4 \times 10^6$ kg of DDT accumulated in the Antarctic snow.

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