APPLICATION METHODOLOGY FOR THE CAT FLEA *CTENOCEPHALIDES FELIS* (BOUCHÉ).

E. W. MOYSES AND F. J. GFELLER
CIBA-GEIGY Ltd., Basel Switzerland

Mortality rates of insects, following exposure to an insecticide, give a numerical measure of effectiveness which can be used in structure-activity correlations, resistance measurements etc. Bioassays involving insecticide treated surfaces (tarsal contact tests) may lead to varying doses being picked up by individual insects. These tests are nevertheless popular because of the ease with which groups of insects can be examined. Exposure of individual insects to a precise dose of an insecticide, rather than to a given surface concentration is obviously more accurate. Exact timing of a synergist application relative to the insecticide application also becomes possible. The "topical application" method of administering individual doses to insects is a standard technique for resistance measurements in higher Diptera (and ticks) where handling and treatment are straightforward. Although fleas are much smaller and usually tested by exposure to a treated surface, the effort was therefore made to develop topical application methodology for fleas.

This poster explains how cat fleas can be treated individually with 0.1microliter (µl) of technical insecticide dissolved in acetone, using a Hamilton microapplicator (MICROLAB™ 500) to accurately deliver doses of a fraction of a nanogram (ng = $1x10^{-9}$g) per insect. The adult fleas are placed on a gauze-covered aperture through which carbon dioxide slowly flows. The insects are thereby anaesthetized (always less than 3 minutes) before they can position themselves to jump. Treatments are made with the aid of a binocular microscope. The liquid droplet is "stroked" onto the insect to overcome the surface tension of the liquid. Immediately after treatment the insects are transferred to test tubes, containing a vertical strip of filter-paper, and capped with perforated Parafilm. Mortality counts are made after a 24h holding period at 22°C and 55% relative humidity.

The flea strain was originally collected in Copenhagen in 1981 and is still maintained at the Danish Pest Infestation Laboratory, Lyngby, as strain 02. We have it on an artificial feeding (cattle blood) system since 1990. Results in the form of probit analysis regression lines are given for a range of standard insecticides. The LD_{50s} in ng/insect with 95% Confidence Limits (CL) and Slope with Standard Error (SE), according to SAS probit analysis, are as follows:

Insecticide	*LD_{50} (95%CL)*	*Slope (±SE)*	*Insecticide*	*LD_{50} (95%CL)*	*Slope (±SE)*
azamethiphos	0.42 (0.39–0.45)	4.4 (±0.42)	diazinon	6.2 (5.7–6.7)	5.5 (±0.62)
cypermethrin	1.4 (1.2–1.6)	2.8 (±0.30)	dimethoate	6.9 (6.2–7.7)	3.4 (±0.34)
fenvalerate	1.4 (1.2–1.6)	2.6 (±0.28)	permethrin	7.2 (6.3–8.6)	3.8 (±0.59)
malaoxon	1.4 (1.3–1.5)	3.9 (±0.39)	bendiocarb	12 (9.6–16)	1.5 (±0.14)
profenofos	2.5 (2.2–2.7)	4.2 (±0.43)	malathion	12 (11–13)	4.4 (±0.32)
fenthion	2.6 (2.2–3.0)	3.4 (±0.39)	dichlorvos	15 (14–16)	4.5 (±0.43)
fenitrothion	2.7 (2.4–3.1)	2.9 (±0.29)	DDT	58 (47–70)	1.5 (±0.12)
chlorpyrifos	3.0 (2.7–3.4)	3.3 (±0.33)	propoxur	110 (77–130)	1.5 (±0.15)
pyrethrins	5.8 (5.1–6.6)	2.8 (±0.26)	carbaryl	130 (55–360)	0.35(±0.05)

All these regression lines are homogeneous. This bioassay may prove to be a robust basis for chemical and strain comparisons.

Proceedings of the Second International Conference on Urban Pests.
K.B. Wildey (editor). 1996