METHODS AND MATERIALS

(1) Test insects. The housefly *Musca domestica nebulo* Fabr., is one of the most important insect affecting the health and well being of people in India. Besides being an efficient carrier of disease pathogens such as those of *cholera* and dysentry, it is a tremendous nuisance and occurs in multitude in nearly all parts of the country. It is smaller in size than *M.d. domestica* and has narrower thoracic bands and lighter colouration of abdomen. "Both sexes possess 4 thoracic stripes. In male flies the median, abdominal stripe expands anteriorly on the first apparent segment to form a dark band across the anterior half but it is narrower than in *vicina*; tergum 3, in addition to a silvery stripe, has silvery patches at the margins; on tergum 4, silvery stripe and silvery patches are more prominent. The female vertex and cheeks are creamy white; abdomen is light orange; silvery stripes and spots in the remaining segments well marked." Roy and Brown (1954).

*Musca domestica vicina* Macq., is characterized by having four well defined dark thoracic stripes in both sexes. It is intermediate between *domestica* and *nebulo* in frontal width (Sabrosky, cited by Brown, 1958). This form of housefly is prevalent in Middle East countries and is also found at lower elevations in India. The strain tested
during the present studies was derived from flies originally collected from Chakrata, a hill-town in the Himalayan range.

(2) **Rearing technique.** The flies were reared at a temperature of $28\pm1^\circ C$ on cotton pads soaked in diluted milk and sugar. The rearing medium was prepared by diluting buffalo milk with an equal amount of water and adding 3.5 grams of sugar per pound of the diluted milk. The adults were kept in nine-inch cages constructed of wire frames covered with meshed cloth (Figure 1). Small petri dishes containing the food were placed in each cage. The flies readily oviposited on the cotton pads and the dishes containing the eggs were removed after every twenty four hours. The eggs were embedded in glass jars containing rarified layers of cotton-wool soaked in diluted milk. About two hundred eggs were seeded in each glass jar, 3" x 4" in size. The jars were covered with muslin cloth in order to prevent the larvae from escaping out and to avoid oviposition from outside flies. On the third day of the embedding of the eggs, a layer of dry cotton wool was added to each jar for it was observed that when four-day-old, the larvae crept on to the dry cotton layer and pupated there. The pupae were picked out of the cotton-wool and collected in small petri dishes which were later placed in meshed cloth cages containing sugar cubes for the flies to feed immediately.
after emergence. Later on, the adults were fed on cotton-wool pads soaked in diluted milk.

(3) Test methods. The susceptibility levels of the adult flies were determined by topical applications in which measured drops of insecticide solutions were applied by means of a hypodermic syringe. The syringe, filled with the desired concentration of the insecticide, was held in between the two arms of a metallic clamp fitted in the U of a screw gauge (Figure 2). The flies were given a slight dose of carbon dioxide which greatly facilitated their handling during the testing operations. Each fly thus anaesthetized was held by its wing with a fine forceps and brought to the tip of the needle. A measured drop of the insecticide solution was placed on the dorsum of its thorax, the size of the drop being controlled by means of the screw gauge fitted against the head of the syringe. The treated flies were kept in 2.5 x 1.5 in., cage made of rice-paper and cardboard (Figure 1). A circular hole was cut in the top of each cage through which the flies were released in. This was later plugged with moist cotton-wool which not only checked the flies from escaping out, but also provided suitable moisture conditions during the post-treatment period. A small cube of sugar was also put in each cage which was used only once to avoid any chance of contamination.
Figure 2. Topical application apparatus
(4) **Chemicals.** The chemicals used were p\(^{1}\) p\(^{-}\)-DDT and technical dieldrin (WHO, 1096) obtained through the courtesy of Mr. J.W. Wright of the World Health Organization. They were dissolved in three solvents, ethanol of 99 per cent purity manufactured by the Bengal Chemical Works, Calcutta; analytically refined acetone of the British Drug House and risella oil 117 supplied by the Shell Oil Company.